

Centre for International Health
University of Toronto

HIV/AIDS TRAINING AND KNOWLEDGE OF HEALTH CARE WORKERS IN KEP

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RASA IZADNEGAHDAR

**Research Associate
Queen's University at Kingston, Ontario**

INTRODUCTION

The following is a report intended to aid the Centre for International Health in the development of future programming to support the Kep Ville operational district's health services offered to HIV patients. This report is based on a series of interviews conducted between May and July of 2004 in the referral hospital and three health centres of Kep. The interviews were completed as part of an undergraduate honour's thesis project for the Life Sciences program at Queen's University. The project was conducted within a larger scope of HIV knowledge, attitudes and practices of healthcare workers (HCW). This report however, seeks to convey the information attained which is deemed to be programmatically relevant to the CIH. As a result, there will be a large focus on demographics of the healthcare staff and their HIV-specific training and levels of knowledge.

The report has two primary objectives. The first is to be a comprehensive resource for understanding the demographics and training background of staff at the referral hospital (RH) and three health centres (HC). The future success of the CIH is dependent on building trusting and reliable relationships with local HCW counterparts in Kep. It is hoped that the information provided will facilitate that process by establishing a degree of familiarity with the staff. Moreover, such information can lead to an understanding of the human resources available at the referral hospital and health centres which may be useful in future decision making. Several previous studies conducted by research associates of the CIH have included an assessment of various components of demographics and educational background of HCW in Kep. These include reports by Dr. Patrick Skalenda and Anthony Fong. It is the aim of this report to complete the information presented in those reports and provide a complete picture of 'who's who' in terms of HCW in Kep.

Secondly, this report will demonstrate the baseline knowledge of HCWs in Kep as related to HIV/AIDS. The report will further indicate areas of strength and weakness as well as those needing reinforcement. It is hoped that the highlighted levels of HIV related knowledge will serve to establish a framework around which relevant educational programming can be developed as part of the future goals of the CIH. A modified copy of this portion of the report will also be presented to the HIV/AIDS coordinator of the Public Health Department as well as presented to the Directors of the RH and HCs. The identified knowledge gaps will be attempted to be addressed in yearly 'refresher' training programs (3 days in duration) offered by the Operational District office (OD). Currently, the topic of HIV/AIDS is incorporated into the STI training program as there are not enough financial resources available to the OD for a separate program.

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METHODS

The project upon which this report was based was conducted as a cross-sectional descriptive study using a structured multi-component questionnaire. This report will include the majority of the information attained from the open-ended questions regarding demographics and training as well as fixed-choice questions regarding HIV/AIDS knowledge. The fixed-choice questions which will be discussed had 3 options of True, False and Don't Know. This component of the questionnaire was organized in eight broader categories. These include diagnosis, symptomology, epidemiology, transmission, universal precautions, treatment, sterilization and opportunistic infections. The results and discussion will be presented within the framework of these eight categories.

Individual interviews were conducted with 31 healthcare workers from all Health Centres in Kep including Angkoul, Pong Teuk, and Okrasar as well the Kep Referral Hospital. All members of staff at each HC were interviewed. At the Hospital, only members of staff that had patient contact were interviewed. There were at least four individuals responsible for outdoor maintenance, accounting and other tasks not involving patient interaction. Additionally there was one staff member, a midwife, who was on Holiday for two weeks during the course of the project and was not interviewed. The total number of staff at the hospital at the time of the interviews was 17. All interviews were conducted with the same translator and interviewer and the participants were offered a per diem of \$1 for their time. The per diem was accepted by all with the exception of the RH Director, Dr. Nourn Seng. Nearly all interviews took place in the morning work hours as they are most reliably attended by HCW.

The project, including its methods and survey tools, was approved by the Queen's University Research Ethics Board. The Directors of each HC and the RH were the first point of contact and were asked permission for the conduct of the study. All participants were provided information about the study and its objectives and asked for consent before the questionnaire was initiated. Signatures of consent were recorded separate from the records in the interviewers' data book. The participants were ensured of strict confidentiality and that their names would not be used in any report provided to the OD office or the Director of their respective place of occupation. As a result, the following report is intended only for internal CIH attention and should not be further circulated.

In several instances throughout the report, quotes from the interviews conducted will be used to demonstrate the attitudes conveyed. Many of these quotes were unprompted and were elaborations presented following the response of the participant. The following two letter location codes will be used throughout the course of the report in reference to a specific healthcare facility:

Abbreviation	Location
AK	Ang Koul HC
OK	Okrasar HC
PT	Pong Teuk HC
RH	Kep Hospital

DEMOGRAPHICS

This section of the report will present demographic information stratified by name including occupation, sex, age, main stated responsibilities, and tenure of the participant. Each location will be presented separately. 'Occupation' is defined as the most common role of the HCW and is elaborated on in 'Main Responsibilities'. Occupations are described as were reported and attention should be paid to information on training before any assumptions of experience are made. Birth spacing is the term used for administration of the birth control program. The first point of contact for a patient with a general sickness visiting any center is denoted by 'general consult'. It is worth noting that the division of labour at the health centres is flexible, especially given that very rarely will all members of staff be present outside of the morning hours. 'Tenure' is the number of years that the participant has been working at the current location. It is important to take tenure as well as other training discussed in the next section into consideration when assessing the level of experience of a HCW, as a relatively short term experience in a Phnom Penh hospital may have resulted in more patient contact than a longer terms position in Kep.

Participants were also asked about the number of patients they have contact with or provide care for in an average day of work and how long on average they spend with each patient. This was easier for the HC staff to answer, as the RH is exposed to a variety of patients requiring a wide range of care. From this information a number of 'patient hours per day' was tabulated. Of the 31 participants, 16 reported 2 hours, 10 reported 1 hour, and 5 reported 0 hours as the average number of hours spent with a patient in a given day. The 5 HCW who reported 0 hours were nonetheless interviewed as they were determined to have responsibilities which resulted in patient interaction or exposure to HIV on some level. These included monthly community injections, dispensing of medicine, and cleaning.

The average age for all participants was 35.2 years old (range 23-57). The relatively low average age is indicative of the infancy of the present health care system in Kep. Many who were responsible for general patient consultation have recently graduated and are below the age of 30. There were a total of 19 male participants and 12 female participants resulting in a male to female sex ratio of 1.58. The average tenure for all participants was 3.9 years. The average tenure in all three HCs is relatively close to the opening date of the facility suggesting that nearly all of the current staff at the HC have been present since then. Since AK is the most recent HC to begin operation (2002), it has the lowest average tenure of 2.2 years, whereas the RH which was originally built in 1964 and renovated to its current state in 1995 has the highest average tenure of 4.5 years.

Certain occupation classifications such as Midwife and Nurse have two distinctions based on the level of training possessed by the HCW. This was translated as 1st and 2nd Midwife and 1st and 2nd Nurse. In previous reports 1^o and 2^o have been used and these are interchangeable. It is important to note that 2nd or 2^o classification is of higher training as it is indicative of the completion of a three year program; whereas 1st or 1^o indicates completion of a one year program. This distinction is further elaborated in the Educational Background portion of the report. In instances where more than one HCW at each healthcare facility has the same occupation, they will be differentiated by a number. This number is not related to experience, training or any other factor but is merely intended to aid readers in correlating the various tables of the report. Occupational abbreviations will also be used in certain instances including:

Abbreviation	Occupation
MSC	Medicine Stock Coordinator/Pharmacist
FPC	Family Planning Coordinator
CVP	Community Vaccine Program Nurse

Angkoul HC

The average age at AK was the highest at 41.8 years old. AK provides service to four villages which are arguably the poorest in Kep. AK is the farthest HC from the main waterfront center of Kep. Attendance at the health centre is low and that is attributed by the Director to the high prevalence of low education and poverty in the local population. The Director has been responsible for AK villages even before the opening of the HC in 2002 when he coordinated his activities out of Kep RH. He has acted as a 'rogue' to the rules of the OD in several ways in the past. Most notably, he resisted complying with the user fee program for four months before being forced to implement the program at threat of losing funding for medicines. He blames the user fee program and the uselessness of the village chief approved exemption for contributing to further low attendance at the HC. No member of staff reported working less than 4 hours per day and two members including the Director and the immunization program director reported staying at the HC for at least 7 hours. Almost all members of staff have been working there since the HC was opened. The midwife had been offering private midwife services for 2 years prior to the opening of the HC and continues to do so to supplement her income. The Medicine Stock Coordinator reported 0 hours of average patient contact. This is despite her major role in the monthly community immunization programs which last for 3-4 days and involve up to 30 vaccinations.

Name	Occupation	Sex	Age	Main Responsibilities	Tenure (years)
Sorn Bek	Director	M	57	administration and reporting	2
Prom Samay	Patient Consult 1	M	54	general consult, immunization program director	2
Um Keo	Patient Consult 2	M	26	general consult, STI cases and birth spacing	2
In Som	Midwife	F	45	deliveries, pre/postnatal care	4
Yom Sina	MSC	F	27	dispense medicine, community immunizations	1

Okrasar HC

OK serves the smallest population and offers services to two villages. It is situated between the centre of Kep and the closest major city of Kampot, which is the provincial capital of Kampot province. As a result, many of its staff including the Director reside in Kampot and commute by moped to work. The staff attendance at this HC seemed to be the best and usually included more than one person in the afternoons. Reported hours of work ranged from 8 hours by Mohk Nhoeun to 2 hours by Uk Aun. The latter was due to the long commute to work and poor road quality especially during the rainy season. Almost all at OK are original staff. Almost a year ago, one HCW retired at the age of 63 and was replaced as suggested below by Uk Aun. The Medicine Stock Coordinator and the Staff member both reported 0 hours of average patient contact. It should be noted that Ung Sophy reported providing basic education with regards to HIV infection and condom use at all community immunization programs that she was involved with.

Name	Occupation	Sex	Age	Main Responsibilities	Tenure (years)
Sok Chenda	Director	F	30	general consult, administration and reporting	5
Uk Aun	Patient Consult 1	M	33	general consult, community immunization	1
Mohk Nhoeun	Patient Consult 2	M	24	general consult, STI cases	4
Chin Sunnary	Midwife	F	35	deliveries, pre/postnatal care, birth spacing	5
Ung Sophy	MSC	F	41	dispense medicine, community immunizations	5
Khet Samnang	Staff	M	26	community immunizations, guarding	4

Pong Teuk HC

PT serves the largest population and offers services to 5 villages. The HC has been operating since August 1999. PT also has the largest number of staff and is the only location where there staff is mostly female. The high number of staff at PT results in attendance by all staff being quite rare. At least 3 of the staff members including the two community nurses and the family planning coordinator reported an attendance of only one to two days per week and only for two or three hours each of those days. Not a single member of staff reported working longer than 4 hours per day. The average age at PT was lowest at 31.5 years old. The Midwife hired most recently is the primary midwife of the centre. The younger midwife does not work frequently and noted having contact with less than 3 patients in a given month. Both she and the Medicine stock coordinator reported an average of 0 hours with patients in a given day. The Director noted being involved only minimally with general patient consultations which are provided by Aun Peou and being mostly focused on administration. Surprisingly, two of the most active healthcare workers of PT are the two that have been most recently hired.

Name	Occupation	Sex	Age	Main Responsibilities	Tenure (years)
Lim Ang	Director	M	49	administration, reporting and general consult	5
Aun Peou	Patient Consult 1	M	41	general consult, community immunization	1
Phru Sarang	Midwife 1	F	34	deliveries, pre/ postnatal care, birth spacing	1
Sen Channtha	Midwife 2	F	29	antenatal care	5
Mech Saron	FPC	F	33	family counselling, birth spacing	5
Heng Nary	MSC	F	42	dispense medicine, community immunizations	5
Pich Bopha	Community Nurse 1	F	23	community immunizations, health counselling	4
Lim Sareoun	Community Nurse 2	M	28	community immunizations, guarding	5

Kep Referral Hospital

As previously mentioned the total number of staff at the hospital at the time of the interview was 17 (11 Male, 4 Female). Five of these including a midwife were not interviewed. The sex ratio is significantly greater towards males at the RH than at any HC where it is relatively equal. All doctors with the exception of the 'staff Director' share the responsibility of outpatient consultations. Dr. Nourn Seng, the 'staff Director', is the Vice-Director of the Kep Operational District responsible for the RH. However, he has been working at the hospital since 2000 when there was a staff shortage and the hospital was in need of more personnel. Despite this, he seems to work at an arm's length of the daily activities of the RH. The main administrator of the hospital is the Deputy Director, referred to as Dr. Dinah, and as far as the Ministry of Health is concerned, the RH is not listed as having an official Director. A doctor and nurse are specified by the Deputy Director to assist the ROSE charities surgical team for their monthly on-site surgical program. At least four members of staff live on the hospital grounds. There is an x-ray, ultrasound, and basic laboratory available at the hospital. In addition, the hospital implements DOTS and has a TB ward. All members of staff interviewed at the hospital reported an average of 1 or 2 hours of direct patient contact in a given day.

Structurally the hospital was expanded to its current size with renovations in 1995 which expanded the hospital as well as moved the Operational District office to a separate site close to Damnak Changau Market which is about 3 kilometres out of central Kep on the way to Kampong Trach. The original building consisted of the back rooms and was built in 1964. Currently, four of the doctors including the Deputy Director live on the hospital grounds. They stay in two of the administration rooms on cots free of charge.

Name	Occupation	Sex	Age	Main Responsibilities	Tenure (years)
Chiv Chandina	Doctor 1 Deputy Director	M	47	administration, DOTS, ultrasound, x-ray, general consult	9
Nourn Seng	Doctor 2 'staff Director'	M	35	administration with OD, major illnesses, OB/GYN	4
Pich Visal	Doctor 3	M	48	general consult, ROSE surgical assistant	3
Hing Socheat	Doctor 4	M	31	general consult	1
Noun Sathya	Doctor 5	M	30	pediatric cases	1
Chan Sokha	Doctor 6	M	25	general consult	1
Pou Mouy	Midwife	F	36	deliveries, pre/postnatal care, family planning	8
Sou Han	Radiologist	M	50	x-ray photography and development	15
Heng Sokhan	2 nd Nurse 1	M	30	injuries and stitching	4
Ny Botith	2 nd Nurse 2	M	29	dispenses medicine, responsible for laboratory	3
Soeun Yav	2 nd Nurse 3	M	26	pediatric cases, ROSE surgical assistant	2
Kong Sophal	Blood Testing	F	28	Malaria/Typhoid testing	3

EDUCATIONAL BACKGROUND

This section of the report will highlight training and previous work experiences of the HCW in Kep. Each location will be discussed separately and the information will be stratified according to occupation. The information provided will include whether or not the HCW has certification, the location and duration of their training, the training completion year and previous work experience.

The issue of certification requires an explanation of certain political circumstances surrounding the Khmer Rouge. In the late 1990's, the government introduced a program to incorporate former members of the Khmer Rouge (KR) into official government positions as a way of absolving past divisions. Many of these included placements within the Ministry of Health (MoH) including at health centres and hospitals which were mostly understaffed at the time. As a result, certification and a work permit from the MoH were given to former KR members despite varying levels, and often quite low, levels of experience. Thereby, even though some HCW have studied at a certified training centre and graduated to attain a certificate, others have completed a condensed course of varying degrees at the referral hospital or no course at all. In one instance, a staff member was given a 1st Nurse certificate based on previous experience with assisting a KR doctor provided she received an additional 3 months of training at Kep Hospital. Those who reported being trained with the Khmer Rouge will be denoted by KR as the content and duration of their training is unclear. Additional training will also be noted.

The issue of certification and training is further complicated by the presence of a wide array of different training programs. In several instances, non-governmental organizations have established training programs which provide certificates. These include certificates for medics and senior medic assistants. In addition, certificates are granted by several army medic training schools as well as an increasing number of private medical schools. Having been around for no more than 5 years, private medical schools are a relatively new phenomenon in Cambodia. They were reported to offer a variety of programs of differing quality. It was mentioned that the lack of standardization in curriculum makes them more of a business than an academic institution. Tuition for these schools runs at around \$400 per year. As of this project, no HCW in Kep was trained at a private medical school. It is unclear what the MoH policy towards such schools is and whether their graduates can be incorporated into government positions or become exclusively involved in private practice.

Within the public MoH training programs, there exist three levels of certification. Nursing and Midwifery regional training centres offer 1st Midwife, 2nd Midwife, 1st Nurse or 2nd Nurse Certification programs. The duration of the 1st Midwife and 1st Nurse Programs are one year, whereas the 2nd Midwife and 2nd Nurse Programs are three years. It is also possible to attain a Midwife certificate with one additional year of training after completing a 2nd Nurse Program. More detailed information on training programs currently available at the training centre can be found in the report by Ann Lovold. The closest and most frequently noted training centre is the Regional Training Centre (RTC) at Kampot, a 45 minute drive from Kep centre. All of those certified as part of the KR incorporation program discussed above were given a 1st Nurse Certificate.

The MoH also oversees the operation of one public medical school in Cambodia. The medical school is called the University of Health Sciences (UHS) and is based in Phnom Penh. The school takes 100 students, usually applying out of high school, every year. Fifty students enter the medical doctorate program and the remaining 50 are distributed between pharmacy, dentistry and research. Tuition is free for these students and they are given a placement by the MoH upon completion of the 7 year program. The starting salary for a doctor is about \$35US per month. This is significantly more than the maximum salary of \$10US received by HC staff.

Where possible, the number of years of training is denoted in brackets in the same field as training location. Several points must be taken into account when interpreting 'Training Completion' as well as 'Previous Experience'. Having completed training long ago does not necessarily suggest that the individual has been practicing for a longer time. Many of the participants went on to farm or serve in the army upon completion of their schooling and have only recently started to work in the profession they were trained for. Secondly, topics of education in schools have varied with time. Only within the last 10 years has the Kampot RTC offered such a comprehensive 3 year program and even more recently has it included topics surrounding HIV/AIDS. Prior to this time, only a one year session was offered and as a result many of the original students have gone back to upgrade their certificate. Finally, it was difficult with respect to temporal and language limitations to completely understand the scope of previous experiences reported. As a result, they vary significantly. It is important to not assume that someone who worked at a hospital has significant experience as they may have played a very limited role in that setting. Where possible, the duration of the reported experience in years is included in brackets following the experience.

In total, 71% (n=22) of the participants are certified and 29% (n=9) are not. Of the 31 HCW, 4 are trained at the University of Health Sciences in Phnom Penh, 4 at other medical school, 11 at Kampot RTC, 5 with the KR, and 7 in other ways.

Angkoul HC

As previously mentioned, the Director was responsible for operating a program to provide nursing care to AK villagers prior to the opening of the HC. This program was operated from the Kep Referral Hospital which is the nature of his previous experience there for three years.

Occupation	Certificate	Training Location	Training Completion	Previous Experience
Director	2 nd Nurse	Monivong School for Army Doctors (5yrs)	1967	Monivong Hospital PP (3yrs), Kep RH (3yrs)
Patient Consult 1	Sr. Medic Assistant	NGO at Thai Border	1991	Pong Teuk HC (2 years)
Patient Consult 2	2 nd Nurse	Kampot RTC	2001	Takeo NGO hospital (1yr)
Midwife	N/A	KR	1982	KR hospital at Thai border
MSC	N/A	KR, Takeo OD	2003	None

Okrasar HC

The Midwife at OK had attended the Phnom Penh RTC as Kampot did not yet have a 3 year program. The Medicine Stock Coordinator started off as a community nurse in PT HC but left for Phnom Penh as the area became concentrated with KR returning to the Chamca Bei stronghold. She returned three years later and worked at Kep RH until OK was built. It was noted in several circumstances that HCW at the Health Centres were originally employed at Kep RH and moved to the respective HC when they were started operation.

Occupation	Certificate	Training Location	Training Completion	Previous Experience
Director	2 nd Nurse	Kampot RTC	1996	Kep RH (1yr)
Patient Consult 1	2 nd Nurse	Kampot RTC	1996	Private Clinic (6yrs)
Patient Consult 2	N/A	KR	N/A	KR hospital at Thai border
Midwife	2 nd Midwife	Phnom Penh RTC	1990	Sihanoukville RH (3yrs), Kampot RH (5yrs)
MSC	1 st Nurse	Kampot RTC	1988	PP Preka Samak Hospital (3yrs) Kep RH (6yrs)
Staff	N/A	Kep RH (3 days)	2001	None

Pong Teuk HC

The level of training and experience at PT was in general significantly lower than other HC. There was only one member of staff for general patient consultations and the Director had not received extensive health training. He did however have several certificates from management and marketing programs. The Medicine Stock Coordinator was likely the second most competent person at the HC and opened the centre up every morning seven days a week, even if for an hour on Sunday.

Occupation	Certificate	Training Location	Training Completion	Previous Experience
Director	1 st Nurse	PP Russia Hospital (3yrs)	1978	Army nurse
Patient Consultations	Sr. Medic Assistant	PP Army Medical School (4yrs)	2001	Kampong Speu RH
Midwife 1	2 nd Midwife	Kampot RTC	2003	Okrasar HC (11yrs)
Midwife 2	N/A	Kampot RH (3ms)	1996	Community Nurse
FPC	N/A	Kep RH (6ms) Kampot RH (3ms)	1996	Community Nurse
MSC	1 st Nurse	Kampot RTC	1999	Community Nurse
Community Nurse 1	1 st Nurse	Kep RH (3 ms)	1999	KR hospital at Thai border
Community Nurse 2	N/A	Kep RH (3ms)	1997	Community Nurse

Kep Referral Hospital

The Deputy Director, Dr. Dina, as well as many of those recently graduated from UHS, is originally from Phnom Penh. Dr. Dina had 4 years of administrative experience with the Ministry of Health before being sent to Kep as the Deputy Director of the Hospital. Dr. Nourn Seng, the staff Director, received a scholarship to study at Hanoi Medical School as part of a partnership program with the UHS. His tuition and living expenses were covered by the MoH for the duration of the seven year program. Doctor 3, Pich Visal, was selected by the Khmer Rouge regime, for which he served as a senior in the army, to become a designated KR doctor. He was sent to Shanghai Medical School in 1975. His tuition and living expenses as well as spending allowance were provided for by the KR government. Subsequent to the completion of his seven year program, he spent three years further specializing in several areas including midwifery and radiology. Upon his return he reported becoming the chief of all medical staff at the KR camps along the Thai Border. He spent 5 years there until 1990 throughout which time he was responsible for training nurses and army medics for the KR. He also reported serving as the physician for the most senior KR officials including Pol Pot.

Sou Han, the Radiologist below, received a 1st Nurse Certificate from Kampot RTC. He has since then worked at the RH. In 2001, he was sent by Dr. Dina for a one and a half month special training program for radiology at Kampot RH. Since then, he is primarily responsible for the operation of the x-ray machine at the hospital. It is important to not assume that his reported occupation of 'radiologist' is indicative of advanced medical training. He is however very interested in learning further about HIV/AIDS and often aids the local Red Cross Volunteer in disseminating pamphlets on this topics to members of the community.

Occupation	Certificate	Training Location	Training Completion	Previous Experience
Doctor 1 Deputy Director	Doctor	UHS	1989	Siem Reap RH (2yrs) MoH Office (4yrs)
Doctor 2 'staff Director'	Doctor	Hanoi Medical School	1995	OD office
Doctor 3	Doctor	Shanghai Medical School (10yrs)	1985	Thai Border(5yrs), Ko Sla (4yrs)
Doctor 4	Doctor	UHS	2000	PP NGO hospital/HBC program (2yrs)
Doctor 5	Doctor	UHS	2000	None
Doctor 6	Doctor	UHS	2002	Calmette Hospital
Midwife	2 nd Midwife	Kampot RTC	1996	None
Radiologist	1 st Nurse	Kampot RTC	1987	Kampot RH
Nurse 1	2 nd Nurse	Kampot RTC	2003	None
Nurse 2	2 nd Nurse	Kampot RTC	1996	None
Nurse 3	2 nd Nurse	Kampot RTC	2001	None
Blood Testing	1 st Nurse	KR	2000	Community Nurse

HIV EXPERIENCE

This section of the report will elaborate specifically on previous training and experience associated with HIV/AIDS. However, a brief explanation of the policy environment surrounding this topic can provide a useful context for understanding how HCW in Kep are trained about HIV and AIDS.

The Ministry of Health through the National Centre for HIV/AIDS, Dermatology and STIs (NCHADS) has for approximately the past 10 years coordinated extensive programming to deal with Cambodia's estimated high rate of HIV prevalence. Originally, the most obvious high risk groups were targeted including commercial sex workers with the '100% Condom Use' program. Since then, extensive policy including the 'National Strategic Plan for HIV/AIDS' and the 'HIV/AIDS Continuum of Care Plan' have been formulated. These policies however, have been implemented to varying degrees in each operational district. The Kep Ville operational district has an HIV program coordinator, Mr. Phat, who is responsible for implementing the programs recommended by the policy. However, because of its small size, Kep only has an Activity Plan instead of also having a Strategic Plan. Effectively, this means that Kep is a low priority area in terms of HIV/AIDS and programming occurs only when financial resources are provided by NCHADS. Certain components of this plan target the health centres and the referral hospital and include specific training programs for healthcare workers. Some of the HCW have been trained through these programs, while others received some training as part of their certificate program whether at an RTC or Medical School. Of the total 31 participants, 32% (n=10) had never received any specific HIV/AIDS training.

The first of these training programs is a yearly STI training course. Each individual hired by the public health department to work at the health centers or hospital receives a week long orientation including basic STI training. Every year thereafter, the director and two other staff members from each HC and the RH attend 3 day 'refresher courses'. The participants are given a per diem of \$5, with those from AK receiving \$7 because of the long distance to travel. There is currently no specific training provided by the OD office for HIV/AIDS. Basic HIV transmission and protective precautions are explained as part of the STI modules. Of the 31 total participants, 19% (n=6) have been trained through this course and this is denoted by 'Kep OD' in the Training Location field of the tables below. The knowledge component of this report will be translated to Khmer and presented to the OD office with the hopes that identified gaps in knowledge will be addressed in the upcoming STI 'refresher' expected within the next three months.

The second component of the plan is the fulfillment of the recent approval for the establishment of Voluntary Counselling and Testing (VCT) services at Kep Referral Hospital. The OD office applied for a VCT permit and was approved on June 1, 2004. Training was subsequently completed for 4 staff from the RH. All 4 staff members attended training at NCHADS in Phnom Penh for one week. Two were trained to offer counselling services and the other two were trained for the blood testing component. The blood testing training included a practical laboratory component. However, despite the completion of the training component, the VCT program will not be in operation until the arrival of testing equipment from the MoH. The director of the Hospital reported that he expected the equipment within the next three months. It was, however, noted at a meeting with the NCHADS director attended by Dr. Grewal that the low priority of Kep will delay the arrival of the equipment until the following year. Additionally, as part of a previous year's activity plan, the Deputy Director and Director of the RH were trained at NCHADS about HIV/AIDS care. They spent one week at the NCHADS office and a second week gaining practical experience with HIV patients at Calmette Hospital in Phnom Penh. Their training represents the most comprehensive continuing education program regarding HIV/AIDS that has been experienced by any HCW in Kep.

Thirdly, the Activity Plan includes a universal precautions training program for the Director and 3 other members of staff from each HC and the RH. This program however, has never been implemented. It is hoped that there will be enough resources to implement such a program before the end of the 2004 year.

Finally, as mentioned NCHADS has established a framework for implementing a Continuum of Care for HIV patients. This strategy involves a Home Based Care program (HBC) with support from village volunteers who would gather information on HIV patients in the community and refer to HC staff for appropriate treatment. A referral system would be in place to ensure that the patient is provided with the necessary care if such care is beyond the limits of the HC. The program was intended to begin by first training the Director and one other staff member of each HC who would then be responsible for training the respective village volunteers as well as other healthcare workers at the HC. This training was conducted in the form of a study tour to several HBC programs in Phnom Penh. The study tour of 1 week duration took place in 2002. This particular training program had been reported by all those who discussed it as being a very positive experience. The unique aspect of the program in facilitating direct patient contact for participants, visits to HIV care sites and accompanying a Home Based Care team were identified as resulting in a more thorough comprehension of the needs of PLHA compared to HIV topics covered in the refresher courses. This program was not discussed at interviews with the AK staff and was only understood in subsequent interviews with other HC. However, it was confirmed that AK staff were also in attendance by the directors of the other HC. It is important to note that for all training programs involving the Director and other members of staff, the selection of other staff is at the discretion of the Director.

In addition to MoH sponsored efforts several NGOs have been working in Cambodia to build the capacity of HCW with respect to dealing with HIV infection and AIDS. The most prominent of these organizations has been the USAID funded Family Health International (FHI). FHI has done extensive work in Cambodia mostly focused on areas with the highest prevalence including Battambang, Siem Reap, and Phnom Penh. To this day, no specific initiative has been implemented in Kep. However, some of the educational material from the FHI programming has been widely circulated. This includes an HIV/AIDS prevention and transmission modes desktop calendar, several posters, as well as wooden penis models for condom use demonstrations. These resources have been provided by the OD to all HC and the RH. In several instances, all in the HC, these educational materials have been the first point of training for members of staff that were not selected to attend training sessions at the OD office.

Furhter information of HIV experience is presented below in location specific tables stratified by occupation with information including:

- o location of HIV training
- o year of first contact with a person living with HIV/AIDS (PLHA)
- o whether or not the HCW has ever provided counselling to a PLHA
- o whether or not the HCW has ever had a friend or family member with HIV/AIDS

The year of first contact with a PLHA was asked in an attempt to assess the familiarity of the HCW with HIV/AIDS patients. However, it must be noted that having seen a PLHA relatively long ago does not necessarily suggest that many have been seen. In one instance, a PLHA was seen as early as 2000 but the one encounter comprised the entirety of the HCW's experience. It should also be noted that 'seeing' does not refer to providing treatment and carried the literary meaning of seeing. Of the total 31 participants, 84% (n=26) reported previously seeing an HIV/AIDS patient. Of those who had seen a PLHA, 27% (n=7) had done so less than or equal to one year ago, 46% (n=12) had done so between 2 to 5 years ago and 27% (n=7) had done so between 5 to 10 years ago.

Counselling was interpreted for the purpose of the interview as the provision of advice on personal care, protection and general well being to somebody with HIV infection. This question, as well as the following on the topic of personal relation with a PLHA, was asked in order to assess the degree of involvement of the HCW with HIV/AIDS. Of the total 31 participants, 55% (n=17) had provided any advice to a PLHA and 45% (n=14) had had a friend or family member with HIV/AIDS. The number of participants who responded 'Yes' to having provided counselling can be a good indication of the number of HCW who have directly interacted with or treated an HIV patients. The importance of giving advice and counselling was ubiquitously expressed by the HCW and it can be assumed that counselling to some extent would occur with each visit. It should be noted that this group is smaller than those that had reported seeing an HIV patient (26 of 31) and suggests that many of those interactions were not necessarily in a HCW capacity. It is also worth putting into context that 45% of all participants (n=14) had not provided any counselling, assumed be the most basic interaction, to a PLHA and 5 HCW reported having never seen somebody with HIV infection. This finding is perhaps indicative of the relatively low prevalence of HIV infection in Kep as well as the low healthcare seeking behaviour of those with HIV infection.

The participants were also asked about the number of HIV patients that attend the HC or RH in one month. Almost always, they noted that it was difficult to say as testing services are far and inaccessible to many. Currently, the closest VCT location is Kampot Referral Hospital, a 45 minute drive away. Further questioning showed a prevalent hesitance to conclude somebody had HIV without a positive blood test. This behaviour was common in nearly all interviews conducted and the participant was subsequently asked how many patients in one month came to the HC or RH whom they thought had HIV infection. As a result, the answers are expected to be a large underestimate of the actual number of HIV patients that would present to the HC or RH. Many of those determined to be HIV positive would be third or fourth stage according to the World Health Organization clinical staging system.

Table 1 below presents the average and range of the responses stratified by location.

Location	Patients/Month
AK	2.6 (2-3)
OK	1.3 (0-3)
PT	0.4 (0-2)
RH	3.2 (0-6)
TOTAL	2.0 (0-6)

Table 1. Average and Range of responses to 'How many HIV patients come to this HC or RH in one month'

It was reported that somebody with known or strongly suspected HIV status would not visit the HC and would more likely ask for a home visit from a private clinic (PC) or a staff member at the HC. Many HCW felt that a home visit was more comfortable for the patient and avoided the embarrassment of being seen at the HC by neighbours or other members of the community. Additionally, it was reported that a home visit would avoid the difficult burden of transportation for the patient 'who is almost always bedridden and tired'. The several comments of this nature that were received further support the conclusion that HIV infection is often perceived as synonymous with late stage AIDS. These comments also suggest that the numbers presented in the above table should not be extrapolated to infer HIV prevalence in the communities due to the simple fact that not all those with HIV infection in the community are seeking healthcare at the HC or RH. Those HCW who also operated a PC in all cases noted that they receive more HIV patients than at the HC. This was on average reported to be between 5-7 patients per month.

Angkoul HC

The Director at AK had extensive training as well as practical experience and was quite willing along with the other male staff to receive further training. Um Keo, Patient Consult 2 below, was noted to have special training on STI as part of his program at the Kampot RTC. His level of sensitivity and HIV specific knowledge was also very good. Additionally, he was very interested in HIV and had gone so far as to visit Chamca Bei village just to see what people with HIV looked like. Since then he visits patients around the villages (reported around 10) with a frequency of 2-3 times per month. He provides medicine to the patients including Paracetamol, Amoxicillin, Nystatin, and Multivitamins. It should be noted that he does not charge for the medicine if it is provided by the HC, but charges the cost of medicines which are available only at local pharmacies. This includes Ampicillin and Gentamycin which are sometimes necessary for the persistent cough reported by the patients.

Furthermore, as mentioned before both In Som, the Midwife, and Prom Samay, the Patient Consult 1 below, operate a private clinic. The midwife's PC is for the most part run by her husband, Pich Visal, who is a doctor at the RH. They see an average of 5 HIV patients in one month usually complaining of fever and pneumonia. As a result, they most frequently prescribe amoxicillin and ampicillin as well as paracetamol. Her specific knowledge on HIV was poor and she was incredibly stubborn in her attitudes. She had little interest in further training and felt competent in her role despite her low level of knowledge and lack of previous training. Prom Samay had a significant amount of past experience and had very thorough knowledge of the surrounding villages. He had a clear basic understanding of HIV and was keen on further training. He also offers private medical services in a nearby village. He reported seeing an average of 40 patients per week with up to 2 per week having an HIV related illness.

Occupation	HIV Training Location	First Seen PLHA	Counselling	Personal Relation
Director	Kep OD	2002	Yes	Yes
Patient Consult 1	Kep OD	2003	No	No
Patient Consult 2	Kampot RTC	1998	Yes	Yes
Midwife	none	2003	No	No
Medicine Stock Coordinator	none	2003	Yes	Yes

Okrasar HC

Two members of staff including Ung Sophy and Uk Aun had close relatives with HIV infection. They were seeking treatment from a traditional healer and one of them knew of the availability of medicines for HIV patients but neither knew of the Takeo program. For this reason, HIV seemed to be discussed more at this HC than the others. The Director, the MSC and the staff responsible for patient consultations were most keen on further training. This HC was the only case in which the MSC had a high level of understanding and was accordingly chosen to attend the study tour in Phnom Penh. She had the longest work experience as well as a great deal of practical experience. She was also knowledgeable to a large degree on HIV/AIDS and available medications, as mentioned above, as her close cousin was infected with HIV. As a result she had made it her responsibility to educate people in villages on the HIV prevention and AIDS as part of her immunization program. It was through Ung Sophy, the MSC, that the Director of the HC had learned about anti-retroviral drugs but both were uncertain about the specific role of these drugs.

Occupation	HIV Training Location	First Seen PLHA	Counselling	Personal Relation
Director	Kep OD, Phnom Penh HBC Study Tour	1995	Yes	Yes
Patient Consult 1	Kampot RTC	2001	Yes	Yes
Patient Consult 2	none	1999	No	No
Midwife	Kep OD	1998	Yes	Yes
MSC	Kep OD, Phnom Penh HBC Study Tour	1999	Yes	Yes
Staff	none	never	No	Yes

Pong Teuk HC

It should be noted that the 'HIV village' in the Phnom War district of Chamca Bei village falls under the service area of PT. The village has been the subject of previous CIH projects and will not be discussed here. However, it is worth putting into context that up to 100 PLHA resided in the village in 2002. Despite this, few had any link to the HC and perhaps surprisingly the knowledge and experience of the PT staff is comparatively lower than other HC. Any care provided outside of the traditional healer's role to the HIV village was delivered by a doctor, Pich Visal, and several nurses from the RH who had previous KR experience which was likely a favourable factor given the area's strong KR ties.

Aun Peou, the individual responsible for patient consultations, was confident with his understanding of HIV infection and AIDS and felt that he had been trained well as part of his medical training program. He also operated a private clinic which gave him greater exposure to HIV patients in the community. His knowledge was quite comprehensive and he was eager to engage in further training. The Director and Medicine Stock Coordinator were also knowledgeable to some extent on issues surrounding HIV/AIDS. However, their personal experience was significantly less as was their level of confidence in caring for patients. The other members of staff at PT had significantly less knowledge and experience with regards to treating patients with HIV infection. Their disposition toward PLHA was greatly comprised of fear and discrimination.

Occupation	HIV Training Location	First Seen PLHA	Counselling	Personal Relation
Director	Kep OD, Phnom Penh HBC Study Tour	1999	Yes	Yes
Patient Consultations	Medical School	2001	Yes	Yes
Midwife 1	none	2003	Yes	Yes
Midwife 2	none	never	No	No
Family Planning Coordinator	Kep OD	never	No	No
Medicine Stock Coordinator	Phnom Penh HBC Study Tour	2002	No	Yes
Community Nurse	none	2003	Yes	No
Community Nurse	none	2003	No	No

Kep Referral Hospital

The level of HIV knowledge and practical experience at the RH was on a significantly higher level compared to any HC. This is in most part due to experiences attained at the training location as opposed to the practical exposure in the current workplace. The hesitation of PLHA in Kep to attend HC is similarly expressed at the RH. Furthermore, at the RH there seemed to exist a direct exchange of information between those staff who had received previous training and others that had not. For example, Pich Visal (Doctor 3 below), who had not received any previous HIV specific training, probably due to his training taking place in China well before HIV was even discovered, had a relatively high level of knowledge similar to his RH counterparts. He attributed this to sharing information with his colleagues as well as reading MoH manuals and other training books. As mentioned before, Pich Visal was requested by Boo, the traditional healer at the HIV village to provide medical care, often at a very high price, in emergency situations including intense diarrhea and fever. This last occurred in 2002.

Many members of staff, especially the doctors, had previously experienced direct patient interaction with PLHA ranging from HBC programs to chronic in-patient care. Hing Soheat (Doctor 4 below) has, as mentioned in Previous Experiences, worked for two years as part of a comprehensive HBC program in Phnom Penh. The program consisted of over 100 men and his responsibilities included counselling, providing medication and managing community volunteers. Chan Sokha (Doctor 6 below) likely had the highest level of knowledge in all eight categories assessed including ARV regimens as Post Exposure Prophylaxis. This was reported to be as a result of his experience working at Calmette hospital in Phnom Penh. However, it should be noted that despite his high knowledge, his level of practical experience is low as he only recently graduated from the Medical School.

Occupation	HIV Training Location	First Seen PLHA	Counselling	Personal Relation
Doctor 1 Deputy Director	NCHADS/Calmette Hospital	1994	Yes	Yes
Doctor 2 'staff Director'	NCHADS/Calmette Hospital	1997	Yes	No
Doctor 3	none	2001	Yes	No
Doctor 4	Medical School	2000	Yes	No
Doctor 5	Medical School	1997	No	No
Doctor 6	NCHADS VCT (counselling)	1999	Yes	Yes
Midwife	NCHADS VCT (counselling)	never	No	No
Radiologist	none	2003	No	No
Nurse 1	Kep OD	1999	Yes	No
Nurse 2	NCHADS VCT (blood testing)	1994	No	No
Nurse 3	Kampot RTC	never	No	No
Blood Testing	NCHADS VCT (blood testing)	2002	No	No

KNOWLEDGE

This section of the report will discuss the information attained based on 26 questions in 8 different categories addressing the levels of HIV/AIDS knowledge of the participants. Each category will be discussed independently and major points will be highlighted.

1. Diagnosis

The issue of diagnosis was addressed by a series of five questions which dealt with knowledge of the early stages of viral infection as well as determination of HIV status through clinical symptoms and blood testing. These questions were intended to explain how HCW recognize and determine which patients have HIV infection.

Generally, it was found that patients are determined to have HIV if and only if they have a blood test result with them or are displaying severe visible symptoms which often include a skin rash and wasting. Effectively, this means that healthcare workers recognize patients who have HIV infection only in the very late stages of full fledged AIDS. There is generally good knowledge of testing but poor knowledge of symptom based diagnosis. There was expressed hesitation over symptom based diagnosis as many other patients present with similar symptoms and it was reported as being 'difficult and inappropriate' to assume that they had HIV. There is a perceived tendency in Khmer culture to assume that a person does not have an 'embarrassing' condition such as HIV until absolutely certain. This must be taken into account when considering diagnosis knowledge.

It was found that the HCW had little understanding of the primary stages of HIV infection. Of all participants, 48% (n=15) reported that HIV patients show signs of sickness within six months of infection, while 45% (n=14) disagreed. This mixed result shows that HCW are uncertain when it comes to recognizing symptoms. The majority of those responding as such were from the HC. In the RH, there was greater knowledge of varying latency of the disease and the specific time of symptom development depending on the health of the individual. Furthermore, this result suggests the perception of HIV as a rapid onset disease. Several participants additionally noted that typically 'people get HIV, live short while and die soon'. This perception and the misunderstanding of the distinction between HIV infection and AIDS were further demonstrated by confusion about a question asking if 'HIV always leads to AIDS'. Based on these questions and other communication it was generally found that the occurrence of HIV infection is viewed as being very proximal in time to late stages of AIDS with visible and identifiable symptoms.

A question with regards to diagnosis based on clinical symptoms resulted in mixed feeling for reasons similar to those discussed above. The majority of HCW, 65% (n=20) believed that clinical symptoms are not enough for diagnosis. 97% (n=30) felt that two blood tests were an accurate diagnosis and 84% (n=26) believed that more than one negative result is necessary to ensure seronegativity. This displays widespread recognition of blood testing procedures. The knowledge of repeated testing in determining seropositivity could be the result of hesitation to ascertain HIV seropositivity and not necessarily of adequate understanding of testing processes. Only a few respondents, all from the hospital, indicated that subsequent tests should be conducted in 3 to 6 months indicating an understanding of testing protocol. Generally, however there was adequate understanding of testing procedures.

Based on the findings, it is recommended that the World Health Organization's clinical staging system for HIV as well as the AIDS case definition for under-resourced settings be incorporated into subsequent educational programming. There exists a basis as well as a need for understanding the basic

etiology of the disease, including infection, latency, and stages of disease progression. Such knowledge would provide a framework in which other topics ranging from diagnosis to universal precautions can be discussed.

2. Symptomology

Knowledge of HIV related symptoms was explored with a multipart question asking about 6 different symptoms including diarrhea, vomiting, fever, confusion, cancer and insomnia. The knowledge of these symptoms varied depending on the symptom and location of the HCW.

Common and palpable or visible symptoms of HIV including diarrhea and fever were well known. All respondents and 97% (n=30) of respondents recognized diarrhea and fever respectively as possible symptoms of HIV. This finding suggests that there is an adequate basis for the incorporation of the WHO AIDS case definition for under-resourced settings into the HCW practice, as it is based on diagnosis of symptoms already known by HCW to be associated with HIV.

Less common and visible symptoms such as vomiting and cancer were less well known and were met with significant uncertainty. 29% (n=9) and 32% (n=10) of participants did not know whether vomiting and cancer respectively were possible symptoms of HIV infection. 61% (n=19) and 45% (n=14) of participants believed vomiting and cancer respectively could be possible symptoms of HIV infection. Many of those who replied 'True' for vomiting had previously been in close contact with a terminally ill AIDS patient whether in the community or through previous work experience. Some of those noted that vomiting presents in later stages of the disease as the patient is closer to dying. The relatively large number of DK for vomiting suggest that few HCW have first hand experience or spend large quantities of time with HIV patients to notice terminal symptoms such as vomiting. It is difficult to generalize the interpretation of cancer in this context. It was unclear how well understood this concept was as several respondents including doctors at the hospital mentioned stomach cancer and liver cancer as frequently associated with HIV infections. It is possible that cancer is interpreted as prolonged localized pain.

Two other symptoms of confusion and insomnia were originally included as false options but were the most strongly supported after fever and diarrhea. 74% of all participants felt that confusion was a symptom of HIV infection and 81% felt that insomnia was also. Both these options were interpreted as non-medical symptoms. Confusion was described by some participants as inability to make decisions, forgetfulness, and general unawareness. Insomnia was interpreted most commonly as trouble sleeping. Some of the healthcare workers at the RH, especially the doctors who in general have more education, held a more strict definition of what constituted symptoms of HIV infection and replied 'False' to confusion and insomnia. The issue of trouble sleeping or insomnia is a common presentation to HCW which accompanies most illnesses. As a result, Diazepam is on a shortlist of essential drugs available at the HC and many patients who visit the HC or RH are given a short 5 day course of the medication to help the trouble sleeping that is associated with a sickness.

The adequate knowledge surrounding basic visible symptoms and general uncertainty around others suggests that most of the symptomology knowledge arises from education programs as opposed to exposure through past experiences which has already been shown to be relatively low. This level of understanding suggests a sufficient foundation for the introduction of the WHO AIDS case definition as the major signs in that definition seem to be well understood. Furthermore, discussion of minor signs would be helpful to reduce confusion on symptomology and perhaps shift the perception of non-medical symptoms from being medically based. This could for example enhance prescribing behaviour of HCW to suggest counselling to a patient with trouble sleeping as opposed to providing Diazepam.

3. Epidemiology

Knowledge of the epidemiology of HIV infection in Cambodia was discussed through a series of questions attempting to highlight understanding of high risk groups. The True/False/Don't Know questions were focused around groups traditionally known to have high risk of infection and others which are not particularly at risk. These included commercial sex workers, injection drug users, hospital staff, young women, heterosexual men, government workers and homosexual men. The participants were assumed to understand the concept of high risk which was difficult to explain. Many HCW noted that 'if you do bad things and make sex a lot, bad things will happen for you, get HIV'. Others would respond only by saying that it is possible for somebody within that group to get HIV infection and thus ignoring the condition of high risk. In these cases the question was re-explained with concepts of chance and relative ease of infection within a group being used to determine the individual's level of knowledge.

Similar to the findings in symptomology that the understanding of HIV infection is most often based on previous didactic training rather than experience, strong knowledge exists only for well known and easily identifiable high risk groups. Commercial sex workers (CSW) and injection drug users (IDU) were both reported by all participants as being at high risk for HIV infection. Furthermore, female sex workers were identified as being the highest risk population in Cambodia by all participants. This suggests the presence of good knowledge of HIV transmission and may also be a result of extensive programming from the Ministry of Health targeting these groups. It was noted that there was previously an establishment offering CSW services in Kep but that it had closed down around 2001 with the implementation of the 100% Condom Use Program. Currently, the closest CSW establishments are in Kampot and they are reportedly frequently visited by groups of young men from Kep. In terms of IDU, several participants remarked that very few if any are present in Kep. Drug use was reported to be mostly a problem in provinces close to the Thai border including Sihanoukville.

The high risk status of 'Hospital Staff' resulted in a mixed variety of answers. The majority at 71% (n=22) felt that the group was not at high risk. While many of these recognized that the group was at some risk but lower than CSW and IDU, others, especially from the hospital, felt that the group was at no risk due to the knowledge of self protection. 23% of participants suggested that the group is at high risk due to non-protected interactions with individuals with HIV infection who have not been tested.

Larger and less strictly defined groups including young women, heterosexual men and government workers also resulted in a mixed variety of answers. These responses can be indicative of attitudes as they were interpreted differently depending on how the group was perceived by the HCW. Despite the varying answers however, there are several clear messages. Young women were overall perceived to be at high risk. Of all participants, 71% believed this to be the case while 26% answered 'False' claiming that they would only be at high risk if they were involved in commercial sex work. Answers with regards to Heterosexual men being a high risk group were almost exactly split between True and False. Many who said 'True' went on to attribute the risk to multiple sex partners and lack of condom use. Similarly, many of those who replied 'False' felt that the group can not be generalized as only those with multiple sex partners or those who do not use condoms are at high risk. As a result, despite the answer, there is clear recognition and understanding of behaviour which increases one's personal risk and susceptibility to HIV infection. A similar mixed interpretation was present for the question of 'Government workers'. Answers were mostly False at 58%, as participants did not feel the group can be generalized and that only certain components such as army personnel and policemen were at high risk. Those who replied 'True' often generalized those two specific groups.

The issue of risk in homosexual men was met with great confusion and uncertainty. As a result, the questions on this topic were modified to determine whether the healthcare worker knew of the possibility of men having sex with men (MSM) and whether this could lead to HIV infection. 45% (n=14) of all participants had not heard about MSM and did not know that such a thing was even possible. Of the 48% (n=15) that had heard about MSM before, most mentioned that it happens mostly in European countries and very rarely in Cambodia. Only two of the doctors at the hospital, who were trained in Phnom Penh, were conscious of MSM transmission in Cambodia and aware of current efforts to determine the national prevalence of MSM based infection. Of the total 31 participants, 58% (n=18) felt that MSM does not happen in Cambodia to any extent. Several HCW indicated that HIV prevention material received from the MoH to display at the HC, which was as previously mentioned originally produced by Family Health International, was the first time they had heard of or seen pictures of MSM. These education aids have cartoon drawings of transmission modes including MSM and anal sex.

Generally, there is adequate knowledge on common modes of transmission and risk groups. However, many of the easily identified risk groups, such as CSW and IDU, are not the most common source of HIV spread in Cambodia, which has most recently been shown to be heterosexual sex excluding commercial sex work. This is perceived to be the case also in Kep and surrounding areas. The figure below summarizes the results of the multipart question on high risk groups and shows the proportion of participants identifying each as high risk.

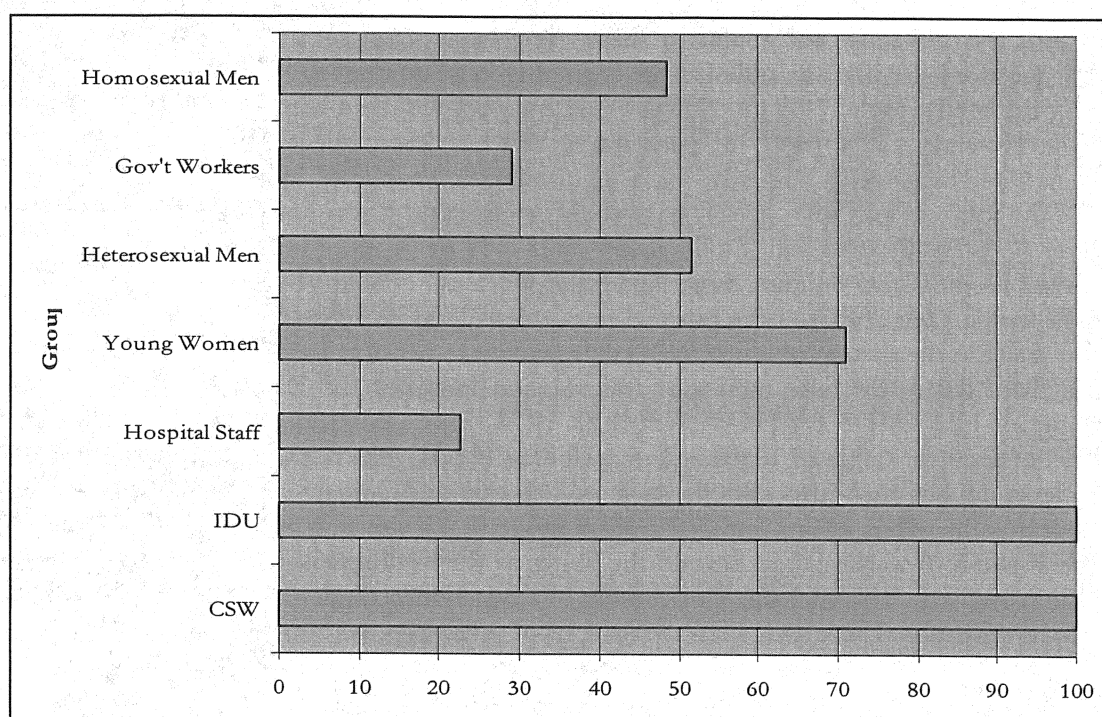


Figure. Proportion of participants identifying the given group as being 'at high risk' for HIV infection.

4. Transmission

Levels of knowledge surrounding modes of transmission of HIV infection were assessed through one multipart question as well as two additional questions which necessitated an adequate understanding of HIV transmission to be answered correctly. The multipart question asked participants about the possibility of HIV transmission through seven different modes. Knowledge on transmission was consistently high at all HC and RH and this group of questions was the most consistently correctly answered group. This is to be expected as transmission modes are the most pertinent topic of understanding in any infectious disease. Adequate knowledge of transmission is important to healthcare workers who seek to protect themselves when providing care and is often the main focus of any initial educational or prevention program. The particular way in which the multipart question was answered however, bears several insights into the depth of understanding presented. The multipart question included three True modes of transmission including blood, semen and vaginal fluid and four False modes including saliva, airborne transmission, skin contact, and nasal secretions.

Five out of the seven possible transmission modes asked about were answered correctly by over 97% (n=30) of participants. This included blood and semen, which were answered correctly by all participants. The remaining three modes of close skin contact, airborne transmission, and vaginal fluid were each answered as 'Don't Know' by only one participant. This was the same participant, trained for only three days at the RH and working at OK, with respect to transmission through the air and skin contact. However, the 'Don't Know' answered in response to transmission through vaginal fluid was the Family Planning Coordinator at PT. No participant answered incorrectly to any of these five modes of transmission.

Knowledge on the possibility of two other false modes of transmission, saliva and nasal secretions was also assessed and less certainty was found in these categories. Nasal secretions was not originally included in the questionnaire but was added at the beginning in an attempt to have at least one obvious false option. Of the total sample, 71% (n=22) answered correctly for nasal secretions not being a mode of transmission. However, 29% (n=9) of participants did not know the correct answer for nasal secretions or answered incorrectly. Similarly, the issue of saliva as a mode of transmission was met with uncertainty. Of the total sample, 68% (n=21) answered correctly that it was not a possible transmission mode. However, 19% (n=6) answered 'Don't Know' and 13% (n=4) answered "True". Of those that answered as either Don't Know or True, most noted that saliva can contain small amounts of virus and thus possibly be a risk. One doctor at the hospital responded 'True' to saliva commenting that cuts in the mouth may result in the mixing of blood with saliva leading to possible transmission. The expressed uncertainty on these latter two false modes of transmission indicates the limitations of the original scope of training of HIV/AIDS for HCW. Nearly all HCW have clear and confident knowledge of high risk and characteristic fluids of transmission including blood, semen and vaginal fluid. As well, there is confidence in obvious false options such as airborne and contact transmission. This basic understanding forms the pillars of any initial education program. However, it is important for HCW to understand the concept of transmission beyond the basics as they will inevitably be faced with unique situations in the workplace. This includes a discussion of other bodily fluids not typically deemed high risk or included in educational programs such as saliva, nasal secretions, and possibly urine.

The figure below represents the proportion of correct answers to the multipart question on transmission modes.

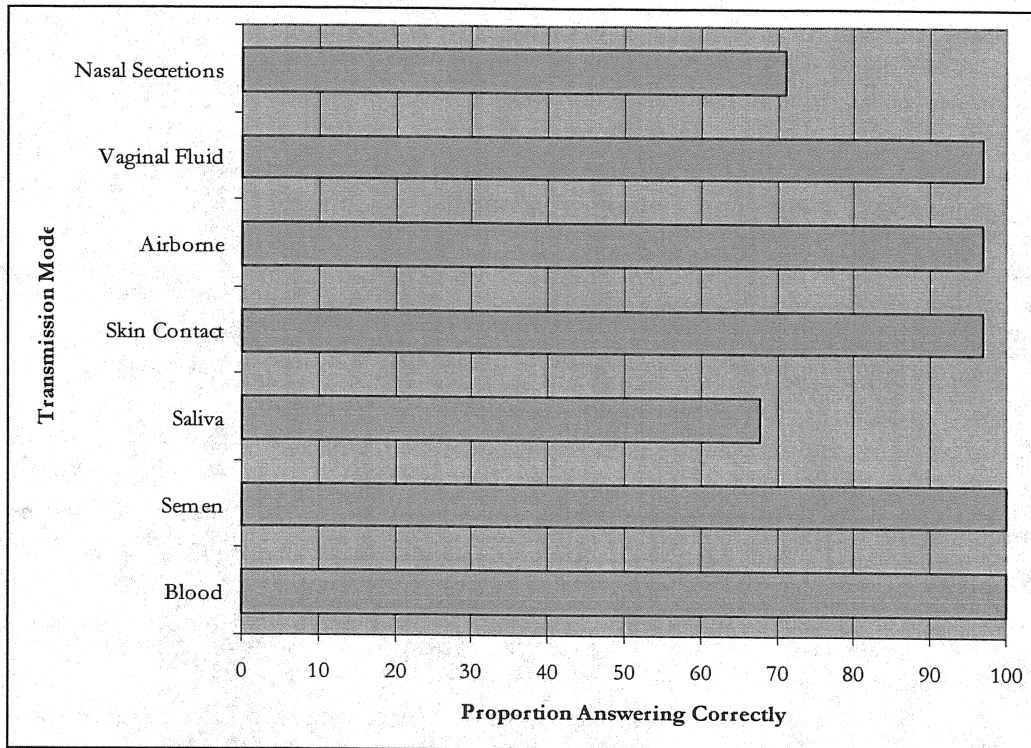


Figure. Proportion of correct responses to True/False/Don't Know questions on seven modes of transmission.

Aside from the multipart question, two questions with regards to the association of high risk of transmission and having multiple sex partners or living with a PLHA were asked. All participants answered correctly that having multiple sex partners puts the individual at high risk of transmission. Participants were further asked if living with a PLHA increases one's risk for transmission. This was answered correctly by all except one doctor at the hospital with extensive previous HBC experience. He had personally witnessed several instances where family members with cuts or exposed lesions were providing care for PLHA with traces of blood on their skin from their rash, thereby placing the caretaker at risk. However, aside from this exception all answered the two questions with confidence.

The relatively low levels of uncertainty in the area of transmission relate directly to and reaffirm the high knowledge of high risk groups discussed in the Epidemiology section above. A recognition of sex workers as the highest risk group in addition to a clear understanding of bodily fluids including semen and vaginal fluids as modes of transmission indicates an adequate level of knowledge with regards to sexual transmission of the virus. Further training on transmission is important as a comprehensive understanding is crucial not only to a better understanding of the epidemiology of the disease but also to the practice of prevention.

5. Universal Precautions (UP)

Universal or standard precaution was not found to be a term used in any context at the HC or RH in Kep. As previously mentioned, the OD is planning on initiating a UP training program within the next year. In the context of this report, UP will be used as a term referring to knowledge about preventative standards and needle safety which are most crucial. It is recommended, despite any knowledge presented, that universal precaution and healthcare worker safety be incorporated into the initial training steps of future programming by the CIH. Many studies regarding UP compliance in the healthcare setting as well as needle-stick safety and the associated risk of transmission have been carried out in different locations. In almost all it has been found that the issue of confidence and understanding of risk is most crucial to good practice. It is intuitive that this confidence is based on practical experience as well as a solid foundation of knowledge. It would be ideal for these factors to be present in the HC and RH in Kep before any scaling up of programming which would result in a significant number of interactions with HIV patients.

Knowledge on preventative practice was assessed using four questions. Three of these were focused on the use of protective equipment and the last on the reuse of needle-sticks. The first of these questions was regarding the theoretical basis of UP that blood and other bodily fluids from each patient should be treated as potentially infectious. Of all the participants 84% (n=26) believed that this was true. However, this is assumed to be an overestimate as in several situations subsequent comments indicated that the question was being interpreted as exclusive to HIV patients and not *each* patient. Upon clarification, many changed their response to something other than True. This led to an expressed perception that all fluids from HIV patients should be treated as infectious as opposed to the original intention of the question.

The next two questions were asked in an attempt to understand the levels of knowledge regarding when to use protective equipment including gloves and masks. Of all participants, 90% (n=28) believed that gloves should be worn at all times when treating a patient with HIV infection and 77% (n=23) believed that both gloves and a mask were necessary when dealing with blood from a patient with HIV infection. Contrastingly, specific practice based questions later found that for most HCW masks are only ever worn with TB patients and gloves are only ever worn if there is visible bleeding.

The high proportion of those deeming masks and gloves as always necessary related to an underlying stigma towards HIV patients. This finding was affirmed by the variation in responses by medical school trained doctors at the RH with previous HIV experience who answered oppositely to both of the above stated questions. Most of the RH doctors believed that masks are hardly ever necessary as 'HIV is not transmitted through the air'. Furthermore, they believed that gloves are rarely useful as 'there is no risk of transmission through skin contact'. The doctors noted that most interactions with HIV patients are as a result of a different condition such as TB for which they dispense medicine and are rarely interacting to a significant degree with the patient. Furthermore, they noted that unnecessary use of protective equipment only breeds further stigma and often makes the patient feel that 'the doctor is upset with them'. Moreover, there was a belief amongst this group of RH doctors that always wearing gloves was unrealistic as supplies were so low with often only one box being available at each HC and RH. Other staff, especially at the HC, had less confidence in their interactions with PLHA. Frequently, they practiced no preventative precautions and only used protective equipment when they were aware of HIV seropositivity. This was often carried out based on fear and worry as opposed to understanding of risk. Many felt that at times even gloves were unsatisfactory in terms of providing the needed protection but were the best they could do.

Finally, one question sought to assess the level of knowledge in relation to the reuse of needle-sticks. Of all participants 97% (n=30) felt that needle sticks can not be reused. One person did not know and was uncertain of proper sterilization procedure. A brief explanation of injection use is essential to understanding the context in which HCW operate with regards to needle safety. All HC implement an Extended Program on Immunization (EPI) which usually takes place for 4 days every month. This program involves staff designated as part of the community vaccine program (CVP) from the HC travelling to different villages which the HC serves to provide immunizations as well as vitamin A tablets to children and tetanus vaccinations to pregnant women. Most children have an immunization card and coordination of several components of the program including the meeting location and gathering of information is the responsibility of the village chief. It was reported that each day an average of 25 injections are given. The needles used are single use auto-disable syringes. UNICEF provides safe disposal containers for needles which are carried around to the injection sites. Used needles are discarded usually without putting the cap back on though some reported using a one hand method to avoid injuries. The reported rate of injury was rather low as no CVP member had experienced more than one injury in the past 2 years. Safety deposit boxes which have been filled are brought to the HC and incinerated. New boxes are obtained on a monthly basis from the OD office.

As is evident, there are clear guidelines for needle care as part of the immunization program. However, this is a greater issue at the HC. Traditionally, there is high demand for injections by patients in a typical visit to a health professional. Healthcare workers at the HC often give Vitamin B injections to appease the patients. They also use safe disposal boxes to discard needles but rarely keep the box close by and more frequently recap needles using a one hand method with the lid on a table surface. It was reported that forgetfulness was usually the reason why the box was not brought to the injection.

Due to the unsafe nature of widespread dispensation of injections in light of transmittable infection such as HIV and Hepatitis B and C, the MoH introduced a policy to limit the injectable medicines available at all HC and RH across Cambodia. This policy change was reported by several staff members, especially those operating private clinics, as having led to a significant shift of patient volume to PC which continue to provide injections. One member of staff who also operated a PC noted giving up to 15 injections of paracetamol every week. Furthermore, those who operate a PC often do not have safe disposal boxes and on two occasions reported putting used needles into a plastic bag and transporting them on their motorbike to the HC for incineration. The injections provided at the HC and PC are therefore more likely to result in injury.

It is important to ensure clear and visibly displayed guidelines for needle use and disposal are in place at each healthcare facility. Such guidelines should also include directions on wearing gloves which was reported and observed to not be taking place even in the EPI program. Additionally, perhaps on a district level, a clear policy on reporting of needle-stick injuries needs to be implemented. No reporting currently occurs and this further contributes to stigma as HCW, especially those involved with the community vaccination program, are afraid of drawing attention to their risk associated accident. It is advantageous that most of those who operate a PC also work at the HC and would therefore be exposed to education focused on this crucial topic. It is worth noting that autoclave sterilization is available at the HC and RH but none of these machines seemed to have been used in the recent past. This is due to all syringes and needles being single use and generally reported as being available in adequate supply.

6. Treatment

Knowledge on treatment issues relating to HIV infection was assessed using a group of four questions. These questions discussed post exposure prophylaxis for healthcare workers, the effectiveness of antibiotics, and knowledge of anti-retroviral treatment. The intention in asking these questions was to determine the level of knowledge as well as the extent of care provided by healthcare workers.

Of all the participants, 26% (n=8) had previously heard of medicines available to HCW who had been injured while treating an HIV patient. All of these participants had learned about this possibility during their training in medical school. However, in most cases they did not know what that medicine was or how they could access it. Only one of the doctors, Chan Sokhan, at the RH was able to identify these medicines and knew of the term post-exposure prophylaxis (PEP). As expected, all but one of the participants having any extent of knowledge of PEP were from the RH. The majority of participants at 61% (n=19) believed that no such medicine exists while 13% (n=4) simply did not know. Several of those who answered 'False' were even confused by the question's suggestion that such drugs exist. They noted that 'all you could do is try to clean the cut and that once the virus was in the body nothing could be done to help'. As can be derived from the absence of PEP knowledge in the healthcare setting in Kep, post-exposure prophylaxis is not part of the National Strategic Plan on HIV/AIDS. The World Health Organization suggests that in the presence of anti-retroviral drugs (ARV), PEP be written into the national policy. However, this has yet to happen in Cambodia as licenses to provide ARV medicines are provided by the MoH only to hospitals which partner with international organizations due to the financial burden of such programs.

The question of the effectiveness of using antibiotics to treat HIV infection was put to participants. Of all healthcare workers, 58% (n=18) believed that antibiotics were not useful in the treatment of HIV infection, while 32% (n=10) believed that they were. This question left the interpretation of treatment as ambiguous and as a result the answers varied significantly despite fairly consistent views that antibiotics are helpful not to the HIV infection per se but rather other infections which may be present. As expected staff at the RH had a more rigid definition of useful treatment and often answered 'False' followed by a comment on antibiotics being useful only for treating opportunistic infections. Similarly, many who responded with 'True' followed with comments indicating an understanding of the effectiveness of antibiotics in helping patients with HIV infection overcome pneumonia or tuberculosis. Often, in the absence of ARV, symptomatic management of opportunistic infections often involving antibiotics is the best care available and this tends to be the case for many PLHA in the area.

Finally, the level of understanding with regards to anti-retroviral drugs was assessed with two separate questions. However, faced with a prevalent lack of knowledge on this topic the questions were modified to determine if recognition of these drugs to any extent existed. Of all the healthcare workers in Kep, only 39% (n=12) had ever heard of ARV drugs. The remainder were completely unaware of any medicine available for HIV infection. Almost all of those that had previously heard of ARV drugs were from the RH with the exception of the AK Director and the Director and MSC of OK where the MSC has a close family member with HIV infection on ARV therapy from a private clinic in Phnom Penh. The staff at the RH who had knowledge of ARV drugs had learned about them over the course of their medical school training or associated practice in hospitals. In most cases, these hospitals were in regions of high HIV prevalence such as Phnom Penh where several ARV programs exist. In other instances this information was passed on or obtained from other staff in the hospital, educational magazines or radio programming. It should be noted that of the 12 HCW who were aware of the existence of anti-retroviral drugs only 8 HCW (26% of the total sample) had any degree of knowledge

on their usefulness or where they could be obtained from. Most of these were knowledgeable of ARV drugs only to the extent that they are not a cure for HIV infection.

It is apparent that the level of care provided for patients with HIV infection does not go beyond symptomatic management of opportunistic infections often with antibiotics. Most HCW were able to identify the role of antibiotics in helping in the treatment of those with HIV infection. There was however, a great paucity of knowledge on HIV specific medications such as anti-retroviral drugs, let alone their specialized use for PEP. This issue needs to be addressed urgently so that healthcare workers, especially those at the HC, are aware of the range of options available for treatment of their patients. Almost all healthcare workers outside of the RH were unaware of the closest ARV program in Takeo. It is also clear from these findings that ARV therapy is not included in training programs including the HBC model study tour hosted by NCHADS for members of the HC.

7. Sterilization

This section of the questionnaire was relatively brief and consisted of one multipart question on knowledge of sterilization techniques for a subcutaneous lesion suspected of contamination with HIV/AIDS as well as another question dealing with heat inactivation of the HIV virus.

The question on sterilization techniques was intended to highlight how HCW deal with injuries and contamination at the healthcare facilities. It is standard procedure, as per the World Health Organization, for any such contamination to be rinsed thoroughly with water and washed with soap. This should be followed by application of an antiseptic for 5 minutes. Options of several antiseptics as well as soap water and salt water were given to healthcare workers who were asked to state which ones could be used in cleaning a possibly contaminated subcutaneous injury. Answers to this question varied significantly and indicate high levels of confusion in terms of what the appropriate sterilization methods for a contaminated injury are. Of all options, Chlorine water and Ethanol solution were most widely supported as antiseptics with 77% of all participants ($n=24$) selecting them as appropriate for sterilization. There was however, significant confusion over chlorine water as it is not typically available at the healthcare facilities for sterilization of contaminated injuries. The most closely related product is Chlorohexidine which is used as a disinfectant in wiping up spills. The next antiseptic mentioned was Povidone iodine solution which was often reported as being used to clean a needle entry point before administering an injection. Of all participants, 71% ($n=22$) felt that it could be appropriately used as an antiseptic as it would kill the virus but few had ever used it in this capacity. A significant amount of uncertainty surrounded the use of Povidone as 23% ($n=7$) did not know whether or not this solution could be used as an antiseptic despite its availability at all healthcare facilities. The remaining options provided as controls including soap water and saline solution were also met with significant uncertainty. Of all the participants, 42% ($n=13$) felt that soap water was adequate to sterilizing the contaminated injury. Contrastingly, only 52% ($n=16$) felt that soap water was not adequate as it would not kill the virus. A surprising proportion of 32% ($n=10$) were uncertain about whether or not saline solution can be used to sterilize a contaminated injury, while 23% ($n=7$) felt that it was an adequate sterilizing agent. The figure below illustrates the distribution of answers provided by all participants:

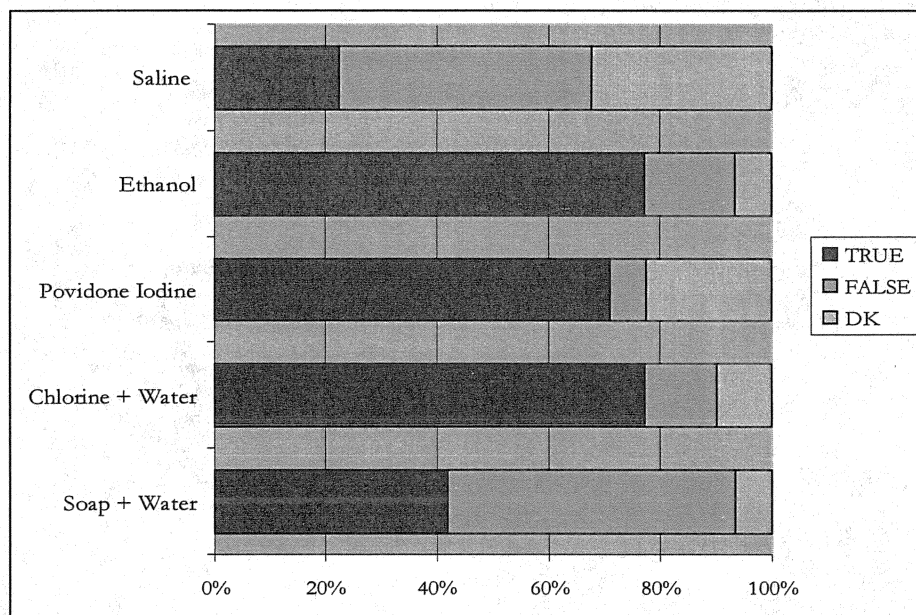


Figure. Proportion of responses to True/False/Don't Know questions on using the five listed solutions for sterilization of a contaminated subcutaneous lesion.

It should be noted that in all instances almost all healthcare workers from the RH answered correctly to all five options recognizing the limitations of soap water and saline and the potential effectiveness of the three antiseptics: chlorine water, alcohol and Povidone iodine. In contrast, the responses from HCW at the HC were not consistent and varied significantly across all three options of True, False and Don't Know. There is a clear need for guidelines on sterilizations techniques including training on appropriate use of antiseptics. This is a crucial and important issue for healthcare worker safety and should complement education programs and training on Universal Precautions.

In addition to the question on sterilization, knowledge of the heat sensitivity of the HIV virus was assessed. Of all participants, 77% (n=24) knew that the HIV virus can be killed in boiling water when left for an adequate amount of time. However, the remainder of the HCW believed that this was not true or were uncertain of the effects of heat on the virus. Boiling is often the simplest and easiest inactivation technique and should represent the minimum knowledge of sterilization. In most instances, equipment is sterilized at the HC and RH, if deemed necessary, by splashing alcohol over the equipment and setting them on fire. As previously mentioned, autoclaves are available but rarely used. It should also be noted that most HCW were generally unaware of what length of time for boiling was appropriate to ensure inactivation and killing of the virus.

8. Opportunistic Infections

Opportunistic infections (OI) were not originally included in the questionnaire but were added upon gaining better understanding of the services available to HIV patients in the study sites and the large focus on management of opportunistic infections. It was the intention of these questions to better understand the level of knowledge surrounding two of the most common opportunistic infections associated with HIV infection in the region being tuberculosis (TB) and pneumonia. To this aim four questions were asked.

Of all participants, 55% (n=17), almost all of whom were from the Health Centres believed that tuberculosis occurs in *all* patients with HIV infection. Only 39% (n=12) of the HCW knew that this highly prevalent OI occurred in only some of those with HIV infection. Not surprisingly, of these 12, nearly all were from the RH. Two further questions were asked about the relation of HIV to TB. Of all the participants, 97% (n=30) knew correctly that HIV infection results in an increased susceptibility to Tuberculosis. Several healthcare workers and nearly all from the RH knew that this was related to the decreased immune competence of a patient with HIV infection. However, 36% of all participants (n=11) also believed that having TB increases one's susceptibility to HIV infection. As before, the majority of the incorrect responses were from the Health Centres and particularly PT. Specific reasons were not frequently given for this response. Interestingly, one member of staff at PT noted that 'people with TB take medications and when they start to feel better they make party and have lots of sex and get HIV'. This finding affirmed an observation that HIV infection is often thought of as being inextricably tied to TB. The confusion over this issue is perhaps fuelled by the fact that most HIV patients are presenting to the HC or RH for TB treatment and are more likely to seek health services when having TB as opposed to general HIV infection which is accompanied with a large burden of stigma. It is important to point out the primary role of TB leading to PLHA seeking healthcare services and what that translates to in terms of the staging of HIV infection for the patient. It was reported by many doctors at the RH that almost all exposure to people with HIV infection occurs when they visit the hospital for the tuberculosis DOTS program implicating that they are most frequently seeking care only in later stages of HIV infection.

Finally, the issue of lowered immunocompetence and relation with susceptibility to pneumonia infection was assessed. Of all participants, 65% (n=20) answered correctly that pneumonia cases occur more frequently in PLHA than in the general population. However, 36% (n=11) of the HCW, believed that this was not the case. All incorrect responses were from the HC with the majority from PT.

As previously indicated, there is a significant disparity in knowledge between the healthcare staff at the Referral Hospital and those at the Health Centres. However, this is not necessarily as a result of more patients with HIV infection presenting to the RH than the HC. Often, this greater knowledge is attributed to the source of training and greater exposure to diseases such as HIV in hospitals of bigger cities where many of the RH staff have previous work experience. The poor understanding of opportunistic infections and their relation to HIV infection suggests that a significant group of HCW in Kep, especially those working at the Health Centres, do not have a clear medical understanding of HIV disease. It is important for the basic etiology of the disease to be conveyed to HCW as this may serve to reduce the associated stigma and enhance treatment by establishing a framework around which opportunistic infections can be appropriately managed. It should be noted that prophylaxis of opportunistic infections was written into the National Strategy on HIV/AIDS but was not being implemented for patients in Kep. The care provided consisted mostly of direct treatment of the presenting complaint often being fever, diarrhea, or TB.

DISCUSSION

The range of knowledge presented in the eight sections discussed above varies significantly between each section. However, within each section and moreover within each question the responses were relatively consistent throughout. A simple pattern emerged where nearly all questions were answered in one of the following three ways:

1. RH staff and HC staff in widespread agreement with a large majority responding the same way
2. RH staff responding differently compared to HC staff but fairly consistently within each group
3. RH staff and HC staff responding with a relatively equal mix of answers across all three categories of True, False and Don't Know

The topics which were mostly answered the first way were generally well understood and included knowledge of epidemiology including high risk groups and transmission. It is clear that these topics have been addressed on several different occasions as part of educational programming. Furthermore, these topics form the basis of understanding about any infectious diseases and serve as an adequate foundation upon which subsequent training can be based. It should be noted, however, that while knowledge of epidemiology of HIV infection was for the most part adequate, there was extreme uncertainty with regards to the perceived prevalence of HIV infection. Most HCW, especially at the HC felt that *nationally*, upwards of 75% of adults aged 18-44 were infected with HIV. This perception that infection rates are extraordinarily high in Cambodia is indicative of several points.

The first of these is a feeling of passive urgency toward HIV infection and AIDS which seems to be present amongst most HCW. Essentially, this means that despite the relatively low perceived prevalence of HIV infection in Kep reported by healthcare workers and the perception by most that the infection rates are decreasing, HIV is regarded as a pertinent issue that needs to be addressed. This may in large part be due to the primary focus of HIV within the MoH policy framework which is evident in each public health department having an HIV/AIDS programming coordinator. Many staff including the directors at the RH and HC felt that even though HIV infections are low in Kep, adequate programming and training is absolutely essential. In fact, all participants interviewed felt that HIV/AIDS education programs should be necessary for all HCW. Further contributing to the urgency factor is that HIV infection is perceived as extraordinarily high in other areas of Cambodia especially urban centres. Only the doctors at the RH had a more accurate perception of the epidemic and even then reported a perceived national prevalence of 5-10%. As a result, the general perception is described as passive urgency as the urgency of the epidemic is perceived in perhaps exaggerated terms despite that urgency translating to extraordinary action on a local HC or RH level.

Secondly, the perceived high rate of infection is perhaps testament to the widespread educational campaigns and resource materials that have also reached Kep suggesting that HCW are well informed. However, this is clearly not the case as there is significant misunderstanding in many respects towards the epidemic. This latter point may also be the result of a lack of accessible media through which accurate surveillance can reach the local HC and RH.

Topics which were mostly answered the second way described above with significant differences noted between participants from the RH and HC were mostly from categories that are more technical and based on practical experience including Diagnosis, Symptomology, and Opportunistic Infections. This pattern of response is especially noteworthy as it represents a significant knowledge gap between the HC and RH staff. As previously mentioned, it was found that RH healthcare workers had a more medical/technical interpretation of questions and often had the previous practical exposure that would

be helpful if not necessary in answering questions correctly. In nearly all instances, HC staff had very little exposure to PLHA especially if they were not involved with a private clinic. This was found in other components of the questionnaire not discussed here to lead to a significantly higher level of stigma and fear towards PLHA amongst healthcare workers at the HC. On the topic of knowledge gaps between staff it is also worth noting that exchange of information between staff at the RH occurred to a much greater extent than at the HC. In fact, those of the HC staff who had attended HIV specific training programs were usually the only ones with an appreciable extent of knowledge on HIV/AIDS topics and empathy towards PLHA. Accordingly, those that had never been selected to attend a training session were oblivious in many ways with regards to HIV/AIDS including protecting themselves from HIV infection. This further fostered a spirit of fear and insecurity at the HC toward patients with HIV infection. As a result, it is important and necessary for training and educational programs to target all staff. Measures should be taken to ensure that this is implemented for example by holding two training sessions at each HC so that those left guarding the HC are not forgotten.

Answers of the third variety with mixed responses across all options regardless of being employed at the RH and HC represent topics that are generally not well understood. These topics, which include Universal Precautions, Treatment and Sterilization are often more advanced and out of the scope of care and policy currently in practice by the health system. As a result, the sources of knowledge for these responses varies greatly ranging from medical schools and practical hospital experience to radio shows, educational magazines, and word of mouth. In general universal precautions (UP) were not practiced. Furthermore, there was an evident dissonance between perceptions and practice with regards to use of protective equipment. Partially this is a result of the lack of adequate resources such as sterile gloves, masks, or the complete lack of gowns. This is not surprising especially at the HC level as few services are ever conducted which would necessitate the use of such equipment, despite such services being offered such as labour. Partially, this is also indicative of the stigma associated with HIV infection and the lack of willingness on the part of HCW to practice universal precautions which would incriminate the patient and 'make them shy or upset'. Despite this lack of practice however, many feel that gloves should be worn in all encounters with HIV patients indicating a sense of fear and anxiety. Those that worked at the hospital and those with more HIV specific training at the HC were more confident of interacting with patients who had HIV infection and often noted being more worried because of their likelihood of having TB.

With respect to treatment, lack of knowledge on anti-retroviral drugs, their role, their functions, their effectiveness or even the source of their acquisition was highly prevalent. The majority of HCW in Kep had never heard of such or any other useful medicines for HIV infection and many more were completely unaware of the MSF program in Takeo (roughly 60 kilometres away) which provides an ARV program free of charge. This lack of knowledge led to the understanding that the extent of care for HIV patients in Kep never goes beyond symptomatic OI management. Even then, only a few HCW had experiences with OI management and knew which medicines would be most suitable for treatment. Prophylaxis of OI was not reported to be practiced by any HCW, even those providing care to PLHA through their PC.

Finally, the issue of sterilization and cut management fell under the third category of response patterns. It was clear that almost all HCW had little experience with such a threat and this lack of experience translated into uncertainty with regards to best practice. This point is especially important in further training and should ideally be incorporated into the UP training program. To ensure clarity and decrease anxiety, concise guidelines should be posted in relevant locations in the hospital and serve as an easily accessible reference. Adequate understanding of these issues is necessary before the RH and HC scale up their services available to HIV patients. Otherwise, the resulting increase in patient load

will translate into higher levels of fear and accompanying discrimination. On this point, it should be mentioned that part of the interviews focused on topics relating to HIV infection or AIDS that the HCW sought to know more about. The most common answer to this question and expressive of similar widespread sentiment was the desire for further understanding on symptomatic determination of HIV status. This desire to be able to better diagnose patients was understood as being useful as it would allow HC and RH staff to take appropriate precautions when treating HIV patients presenting to the hospital for reasons other than HIV infection; which is often the case.

However, it is necessary in the discussion of future programmatic and educational needs of the HCW at the health facilities in Kep to also discuss the current context of interactions with PLHA presenting to the hospital. Currently, there seems to be a significant focus on sexually transmitted infections at the HC and RH. This is stated as a result of at least one member from each healthcare facility including STI management in their responsibilities. Frequently, this individual was trained at Kampot RTC. Furthermore, the Operational District as mentioned offers yearly 3 day training programs strictly devoted to STI. This training has in the past been used as an opportunity to briefly discuss selected topics about HIV which forms the basis of high transmission and risk factor knowledge of healthcare staff.

Further crucial to understanding the context in which HCW interact with PLHA is the health seeking behaviour of PLHA. Almost all participants described people with HIV infection as very shy and very unlikely to visit the HC or the RH. Comments including 'most go into hiding', 'they do not like coming out into the community', and 'they are afraid of being seen with HIV by neighbours' were common. Most who desire care request it through one of their relatives from a PC. This information was validated by HCW who also operated PC and reported seeing two or three times as many patients with HIV infection at their PC than at the HC or RH. It was reported that very poor and desperate HIV patients, mostly women whose husbands have already died as a result of HIV, comprise nearly all HIV visits to the healthcare facilities. Generally, healthcare workers felt that providing care for HIV patients was one of the most difficult things they do. The reasons provided for this were the non-existence of medicine for HIV translating into an associated feeling of helplessness. Several HCW noted that all they could do was to provide counselling which often consumed a lot of time and left the patient feeling unsatisfied as no medicine was provided.

HCWs were also asked several questions about the perceived dynamics of the HIV epidemic in Kep. It was commonly reported that HIV infection in Kep occurs mostly in men who leave for extended periods of time of up to 6 months to go to places such as Sihanoukville or Koh Kong province for fishing. For many of the rural families in Kep, farming does not adequately provide financial support for the family and the short farming season leaves them unemployed for the majority of the year. As a result, many men travel along the Gulf of Thailand coast to provinces close to the Thai border in order to engage in alternative income generating projects such as fishing. They frequently purchase commercial sex while they are away and some become infected with HIV. The infection is then introduced to their wives and possibly subsequent children through mother-to-child transmission upon their return. Many HCW, however, believed that the rate of HIV infection in Kep is decreasing as many people with HIV have already died. There was also a common sentiment that 'after having seen people die of HIV infection, villagers will be careful, protect themselves and not have too much sex'. These two factors were seen as contributing to a decline in the prevalence of HIV infection in Kep.

It is finally important to present a more individual based perspective on the healthcare workers in Kep. All healthcare facilities operate for the most part only in the morning and it is rare to find more than one staff present at the HC in the afternoon. The wages earned by HC staff can be up to a maximum of

\$10 USD per month. This significantly low wage contributes to a low level of motivation amongst most healthcare workers. Furthermore, such a low wage places a financial pressure on the HCW, who mostly have families of their own to support, to look for alternative avenues of income. This may include a related practice such as operating a PC or an unrelated practice such as farming. This low wage devalues the work that the healthcare workers do and limits their ability to be devoted and dedicated to any special programming beyond the scope of minimal care such as community participation programs such as village based clinics. An atmosphere of dissatisfaction and disinterest surrounds the healthcare establishments in Kep as a result of the expectation that the HCW would be completely dedicated to their work without adequate remuneration. As a result of this, continuing education programs offered by the OD office become sources of supplementary income through the per diems given as opposed to their intrinsic value. It can not be expected for healthcare workers to enthusiastically fulfill their role when the wage they are provided is not nearly enough compensation for their time. This leads to many human resource difficulties for the administration of the HC as the Directors often can not come up with any compelling arguments as to why the staff should attend work everyday let alone be punctual or provide longer hours of service if necessary. This has led to a complacent attitude toward staff absenteeism especially during the busy months of high agricultural productivity in the rainy season.

The story at the RH is only slightly better. The members of staff at the hospital earn wages of up to \$35 USD per month. As previously mentioned, the students from the University of Health Sciences, the public medical school in Phnom Penh, receive placements from the MoH upon their graduation. It was disclosed by the deputy director of the hospital that the MoH requires the payment of a significantly large sum of money in order to fulfill a student's application to be placed in a major city centre. All but one of the doctors from UHS including the deputy director were placed in Kep against their other choices as a result of not having enough money to be pay for the placement that they desired. The one other doctor from UHS had actually chosen to be sent to Kep as he desired a quieter life close to the ocean. However, for the rest, being in Kep was contrary to their preference, especially the most recent graduates who would have rather been in a hospital which would provide them with a greater range of experiences. All of these recent graduates as well as the deputy director live on the hospital property. They spend the night in one of the supply rooms on cots, hammocks or foam mattresses on the ground. This creates a more constant presence at the RH and most likely contributes to the greater extent of information sharing found at the RH. The recent graduates noted that they would like to leave Kep after their 6 year placement contract. This was interestingly dismissed by the Deputy Director who had been at the RH for 9 years. He originally had intentions to leave after 6 years as well but was discouraged by the MoH and not given another placement.

In conclusion, it is apparent that the healthcare workers are in a difficult position. They are expected to provide adequate care and possess high levels of knowledge. However, they are rarely given the resources to meet such demands even to a minimal degree. An example of this is the comprehensive Minimum Package of Activities and Complementary Package of Activities that are guides for HC and RH operation respectively, created by the MoH. However, these have not been incorporated into the health system to any appreciable extent and no current program includes their teaching or implementation. It is therefore, not a matter of lacking guidelines and policy but rather a lack of resources to result in their implementation. It is this practical form of capacity building that is necessary for the success of Kep's healthcare system and should form the focus of future CIH programming, especially with respect to HIV/AIDS. Integrated within any such program should be issues of healthcare safety and practical guidelines for the implementation of a safe workplace. This along with the educational components of the program will hopefully foster a positive work environment. Attention, however, should also be paid to the lack of motivation and low wages of healthcare staff. Adequate remuneration in the form of per diems should be provided for all sessions.

SUMMARY

The points below are meant to summarize the major recommendations resulting from each of the eight sections of the Knowledge component of the report. It is suggested that these points be taken into consideration when developing future programming especially HCW training for both the Health Centres and the Referral Hospital.

1. Based on the observed uncertainty and low levels of knowledge with respect to diagnosis of HIV infection based on clinical symptoms and recognition of early stages of HIV infection, it is recommended that the World Health Organization's clinical staging system for HIV as well as the AIDS case definition for under-resourced settings be included in future HCW training programs. There exists a basis as well as a need for understanding the basic etiology of the disease, including infection, latency, and stages of disease progression. Such knowledge would provide a framework in which other topics ranging from diagnosis to universal precautions can be discussed
2. There existed adequate knowledge of basic visible symptoms of HIV infections and general uncertainty around others. This suggests that most of the symptomology knowledge arises from education programs as opposed to exposure through past experiences which is shown to be low. There exists a sufficient foundation for the introduction of the WHO AIDS case definition as the major signs in that definition are well understood. Furthermore, discussion of minor signs would be helpful to reduce confusion as well as improve diagnosis and prescribing behaviour.
3. Generally, there is adequate knowledge on common modes of transmission and traditional high risk groups. However, many of these groups, such as CSW and IDU, are not the most common source of HIV spread in Cambodia, which has most recently been shown to be heterosexual sex excluding sex work. It is recommended that the possibility of HIV transmission and according prevention practice within the household as well as mother to child transmission be emphasized. A significant shift towards these modes will likely continue to increase.
4. Nearly all HCW have clear and confident knowledge of high risk and characteristic fluids of transmission including blood, semen and vaginal fluid. As well, there is confidence in obvious false options such as airborne and contact transmission. However, it is important for HCW to understand the concept of transmission beyond the basics including a discussion of other bodily fluids not typically deemed high risk and often neglected in educational programs such as saliva, nasal secretions, and possibly urine.
5. Universal Precautions have never been discussed at the healthcare facilities and no clear guidelines are available let alone followed in this respect. It is important to ensure that clear and visibly displayed guidelines for needle use and disposal are developed and put in place at each healthcare facility. Such guidelines should also include directions on wearing gloves which was reported and observed to not be taking place even in the EPI program. Additionally, a clear policy on reporting of needle-stick injuries needs to be implemented.
6. The level of care provided for PLHA was not found to go beyond symptomatic management of opportunistic infections often with antibiotics. Most HCW were able to identify the helping role of antibiotics in the treatment of those with HIV infection. There was however, a great paucity of knowledge on HIV specific medications such as anti-retroviral drugs, let alone their specialized use for PEP. Even the few with knowledge on this issue had very little practical experience and many outside of the RH were unaware of the closest ARV program in Takeo.

7. Understanding of sterilization techniques used for a contaminated lesion, especially outside of the RH, was not consistent and varied significantly across all three options of True, False and Don't Know. Many were uncertain of the different possible uses of common solutions as well as their varying effectiveness. There is a clear need for guidelines on equipment sterilization techniques and training on appropriate use of antiseptics. This issue is integral to healthcare worker safety and should complement education programs and training on Universal Precautions.
8. There was poor understanding of opportunistic infections, especially outside of the RH, and their relation to HIV infection. Particularly in the case of TB, the prevalent uncertainty translated into the majority of HCW thinking of TB as occurring in all HIV cases. This suggests the absence of a clear medical understanding of HIV disease. It is important for the basic etiology of the disease to be conveyed to HCW as this may serve to reduce the associated stigma and enhance treatment by establishing a framework around which opportunistic infections can be appropriately managed.

APPENDIX I. Fee Schedule

Below is the fee schedule for services offered at the health centre and referral hospital. This was implemented by the operational district in January 2004 as part of the MoH plan to shift away from free services wherein HCW charged unregulated complementary fees at their own discretion. The prices are the same regardless of the HC or RH at which the service is offered.

Consultation/Examination	1000 Riel
Pregnancy Examination	1000 Riel
Birth Spacing	Pill – 500 Riel Injection – 1000 Riel
Injury Cleaning and wound dressing	3000 Riel
Stitches	5000 Riel
Lancing and dressing of boil or abscess	5000 Riel
Supervised Labour	35,000 Riel
Preventative Medicine (eg. vaccines, vitamins)	0 Riel

Angkoul HC

Name	Occupation	Sex	Age	Main Responsibilities	Tenure (years)	Certificate	Training Loc'n	Training End	Previous Experience	HIV Training Loc'n	First Seen PLHA	Counselling	Personal Relation
Sorn Bek	Director	M	57	administration, reporting	2	2 nd Nurse	Monivong Army Doctors School (5yrs)	1967	Monivong Hospital PP (3yrs), Kep RH (3yrs)	Kep OD	2002	Yes	Yes
Prom Samay	Patient Consult 1	M	54	general consult, immunization program director	2	Sr. Medic Assistant	NGO at Thai Border	1991	Pong Teuk HC (2 years)	Kep OD	2003	No	No
Um Keo	Patient Consult 2	M	26	general consult, STI cases, birth spacing	2	2 nd Nurse	Kampot RTC	2001	Takeo NGO hospital (1yr)	Kampot RTC	1998	Yes	Yes
In Som	Midwife	F	45	deliveries, pre/postnatal care	4	N/A	KR	1982	KR hospital at Thai border	none	2003	No	No
Yom Sina	MSC	F	27	dispense medicine, community immunizations	1	N/A	KR, Takeo OD	2003	None	none	2003	Yes	Yes

Okrasar HC

Name	Occupation	Sex	Age	Main Responsibilities	Tenure (years)	Certificate	Training Loc'n	Training End	Previous Experience	HIV Training Loc'n	First Seen PLHA	Counselling	Personal Relation
Sok Chenda	Director	F	30	general consult, administration, and reporting	5	2 nd Nurse	Kampot RTC	1996	Kep RH (1yr)	Kep OD, PP HBC Tour	1995	Yes	Yes
Ulk Aun	Patient Consult 1	M	33	general consult, community immunization	1	2 nd Nurse	Kampot RTC	1996	Private Clinic (6yrs)	Kampot RTC	2001	Yes	Yes
Mohk Nhoen	Patient Consult 2	M	24	general consult, STI cases	4	N/A	KR	N/A	KR hospital at Thai border	none	1999	No	No
Chin Sunnary	Midwife	F	35	deliveries, pre/postnatal care, birth spacing	5	2 nd Midwife	Phnom Penh RTC	1990	Sihanoukville RH (3yrs), Kampot RH (5yrs)	Kep OD	1998	Yes	Yes
Ung Sophy	MSC	F	41	dispense medicine, community immunizations	5	1 st Nurse	Kampot RTC	1988	Preka Samak Hospital (3yrs) Kep RH (6yrs)	Kep OD, PP HBC Tour	1999	Yes	Yes
Khet Samnang	Staff	M	26	community immunizations, guarding	4	N/A	Kep RH (3 days)	2001	None	none	never	No	Yes

Pong Teuk HC

Name	Occupation	Sex	Age	Main Responsibilities	Tenure (years)	Certificate	Training Loc'n	Training End	Previous Experience	HIV Training Loc'n	First Seen PLHA	Counselling	Personal Relation
Lim Ang	Director	M	49	administration, reporting and general consult	5	1 st Nurse	PP Russia Hospital (3yrs)	1978	Army nurse	Kep OD, PP HBC Tour	1999	Yes	Yes
Aun Peou	Patient Consult 1	M	41	general consult, community immunization	1	Sr. Medic Assistant	PP Army Medical School (4yrs)	2001	Kampong Speu RH	Medical School	2001	Yes	Yes
Phru Sarang	Midwife 1	F	34	deliveries, antenatal, postnatal care, birth spacing	1	2 nd Midwife	Kampot RTC	2003	Okasar HC (11yrs)	none	2003	Yes	Yes
Sen Channtha	Midwife 2	F	29	antenatal care	5	N/A	Kampot RH (3ms)	1996	Community Nurse	none	never	No	No
Mech Saron	FPC	F	33	family counselling, birth spacing	5	N/A	Kep RH (6ms) Kampot RH (3ms)	1996	Community Nurse	Kep OD	never	No	No
Heng Nary	MSC	F	42	dispense medicine, community immunizations	5	1 st Nurse	Kampot RTC	1999	Community Nurse	PP HBC Tour	2002	No	Yes
Pich Bopha	Community Nurse 1	F	23	community immunizations, health counselling	4	1 st Nurse	Kep RH (3 ms)	1999	KR hospital at Thai border	none	2003	Yes	No
Lim Sarcoun	Community Nurse 2	M	28	community immunizations, guarding	5	N/A	Kep RH (3ms)	1997	Community Nurse	none	2003	No	No

Kep Referral Hospital

Name	Occupation	Sex	Age	Main Responsibilities	Tenure (years)	Certificate	Training Loc'n	Training End	Previous Experience	HIV Training Loc'n	First Seen PLHA	Counselling	Personal Relation
Chiv Chandina	Doctor 1 Deputy Director	M	47	administration, DOTS, ultrasound, x-ray, general consult	9	Doctor	UHS	1989	Siem Reap RH (2yrs) MoH Office (4yrs)	NCHADS /Calmette Hospital	1994	Yes	Yes
Noun Seng	Doctor 2 'staff Director'	M	35	OD administration, major illnesses, OB/GYN	4	Doctor	Hanoi Medical School	1995	OD office	NCHADS /Calmette Hospital	1997	Yes	No
Pich Visal	Doctor 3	M	48	general consult, ROSE surgical assistant	3	Doctor	Shanghai Medical School (10yrs)	1985	Thai Border(5yrs), Ko Sla (4yrs)	none	2001	Yes	No
Hing Socheat	Doctor 4	M	31	general consult	1	Doctor	UHS	2000	PP NGO hospital/HBC program (2yrs)	Medical School	2000	Yes	No
Noun Sathya	Doctor 5	M	30	pediatric cases	1	Doctor	UHS	2000	None	Medical School	1997	No	No
Chan Sokha	Doctor 6	M	25	general consult	1	Doctor	UHS	2002	Calmette Hospital	NCHADS VCT counselling	1999	Yes	Yes
Pou Mouy	Midwife	F	36	deliveries, pre/postnatal care, family planning	8	2 nd Midwife	Kampot RTC	1996	None	NCHADS VCT counselling	never	No	No
Sou Han	Radiologist	M	50	x-ray photography and development	15	1 st Nurse	Kampot RTC	1987	Kampot RH	none	2003	No	No
Heng Sokhan	2 nd Nurse 1	M	30	injuries and stitching	4	2 nd Nurse	Kampot RTC	2003	None	Kep OD	1999	Yes	No
Ny Botith	2 nd Nurse 2	M	29	dispense medicine, responsible for laboratory	3	2 nd Nurse	Kampot RTC	1996	None	NCHADS VCT testing	1994	No	No
Soeun Yav	2 nd Nurse 3	M	26	pediatric cases, ROSE surgical assistant	2	2 nd Nurse	Kampot RTC	2001	None	Kampot RTC	never	No	No
Kong Sophal	Blood Testing	F	28	Malaria/Typhoid testing	3	1 st Nurse	KR	2000	Community Nurse	NCHADS VCT testing	2002	No	No

List of Knowledge questions asked:

Diagnosis

1. Persons with HIV usually show signs of sickness before six months after infection. (**FALSE**)
2. HIV infection always leads to AIDS. (**TRUE**)
3. A patient can be determined to be HIV positive based only on clinical symptoms. (**TRUE**)
4. To be certain of HIV infection you should have two positive blood tests. (**TRUE**)
5. One negative blood test is enough to say that a person does not have HIV. (**FALSE**)

Symptomology

6. The following are possible symptoms of HIV infection.
 - a. Diarrhea (**TRUE**)
 - b. Vomiting (**TRUE**)
 - c. Fever (**TRUE**)
 - d. Confusion (**FALSE**)
 - e. Cancer (**TRUE**)
 - f. Trouble sleeping (**FALSE**)

Epidemiology

7. The following groups are 'at high-risk' for HIV infection in Cambodia.
 - a. Commercial Sex Workers (**TRUE**)
 - b. Injection Drug Users (**TRUE**)
 - c. Hospital Staff (**FALSE**)
 - d. Young Women (**TRUE**)
 - e. Heterosexual Men (**TRUE**)
 - f. Gov't Workers (**FALSE**)
 - g. Homosexual Men (**TRUE**)
8. Men having sex with men is the most common reason for people getting HIV in Cambodia. (**FALSE**)
9. Female sex workers have the highest chance of developing HIV infection in Cambodia. (**FALSE**)

Transmission

10. HIV infection can be transmitted through the following.
 - a. blood (**TRUE**)
 - b. semen (**TRUE**)
 - c. saliva (**FALSE**)
 - d. close skin contact (**FALSE**)
 - e. through the air (**FALSE**)
 - f. vaginal fluid (**TRUE**)
 - g. nasal secretions (**FALSE**)
11. Having sex with many partners is a risk factor for HIV infection. (**TRUE**)
12. Living with HIV/AIDS patients is a risk factor for HIV infection. (**FALSE**)

Universal Precautions

13. Blood and fluids from all patients should be treated as having living virus (infectious). (**TRUE**)
14. Gloves should be worn at all times when treating HIV/AIDS patients. (**TRUE**)
15. Masks and gloves are not necessary when dealing with blood of HIV/AIDS patients. (**FALSE**)
16. Needle-sticks can be reused after sterilization in salt water. (**FALSE**)

Treatment

17. HIV/AIDS prophylaxis medicine is useful for doctors and nurses who receive a needle-stick injury when treating HIV/AIDS patients. (**TRUE**)
18. Antibiotics are useful in the treatment of HIV/AIDS. (**FALSE**)
19. Anti-retroviral drugs can be administered to all HIV positive patients. (**FALSE**)
20. Anti-retroviral drugs can cure HIV/AIDS. (**FALSE**)

Sterilization

21. The HIV virus can be killed in boiling water. (**TRUE**)
22. The following are sterilization techniques for a cut which may be contaminated with HIV/AIDS.
 - a. soap and water (**FALSE**)
 - b. chlorine water (**TRUE**)
 - c. ethanol 70% (**TRUE**)
 - d. povidone iodine (**TRUE**)
 - e. salt and water (**FALSE**)

Opportunistic Infections

23. Tuberculosis occurs eventually in all HIV patients. (**FALSE**)
24. Pneumonia cases occur with the same frequency in HIV/AIDS patients as with the general population. (**FALSE**)
25. Patients with HIV have higher chance than normal of getting TB. (**TRUE**)
26. Patients with TB have higher chance than normal of getting HIV. (**FALSE**)

The table below shows the percentage of all participants answering correctly to each question. Averages are located at the bottom of each category.

Question #	Angkoul HC	Okrasar HC	Pong Teuk HC	Referral Hospital	Total
1	40%	33%	13%	75%	45%
2	100%	83%	100%	83%	90%
3	40%	33%	63%	8%	32%
4	100%	100%	88%	100%	97%
5	80%	67%	75%	100%	84%
6a.	100%	100%	100%	100%	100%
6b.	60%	50%	63%	67%	61%
6c.	100%	83%	100%	100%	97%
6d.	0%	0%	13%	25%	13%
6e.	60%	100%	25%	25%	45%
6f.	20%	0%	0%	8%	7%
7a.	100%	100%	100%	100%	100%
7b.	100%	100%	100%	100%	100%
7c.	100%	33%	75%	75%	71%
7d.	60%	67%	75%	75%	71%
7e.	60%	50%	50%	50%	52%
7f.	60%	50%	38%	75%	58%
7e.	40%	67%	13%	67%	48%
8	40%	50%	0%	67%	42%
9	0%	0%	0%	0%	0%
10a.	100%	100%	100%	100%	100%
10b.	100%	100%	100%	100%	100%
10c.	60%	83%	63%	67%	68%
10d.	100%	83%	100%	100%	97%
10e.	100%	83%	100%	100%	97%
10f.	100%	100%	88%	100%	97%
10g.	40%	67%	88%	75%	71%
11	100%	100%	100%	100%	100%
12	100%	100%	88%	100%	97%
13	100%	83%	75%	83%	84%
14	100%	83%	100%	83%	90%
15	80%	83%	75%	67%	77%
16	100%	83%	100%	100%	97%
17	0%	0%	13%	58%	26%
18	60%	83%	38%	58%	58%
19	0%	0%	0%	0%	0%
20	20%	17%	0%	83%	39%
21	80%	100%	63%	75%	77%
22a.	40%	67%	0%	83%	52%
22b.	60%	67%	88%	83%	77%
22c.	60%	67%	88%	83%	77%
22d.	40%	33%	88%	92%	71%
22e.	0%	50%	0%	92%	45%
23	20%	0%	13%	83%	39%
24	40%	67%	25%	100%	65%
25	100%	100%	88%	100%	97%
26	60%	33%	13%	83%	52%
AVERAGE	64%	64%	59%	76%	67%